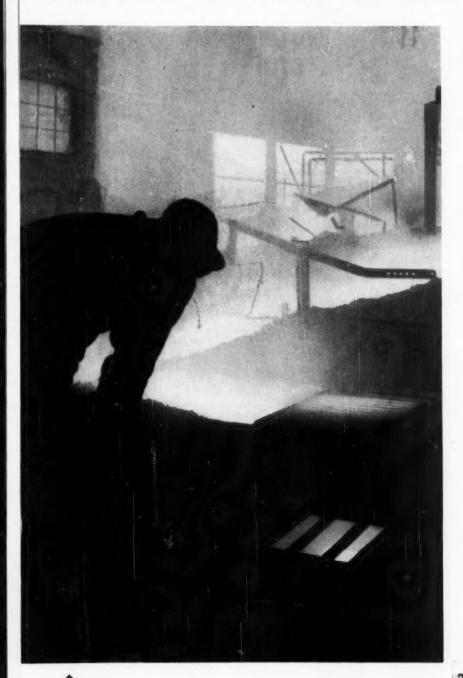
JULY 8, 1961

Chemical Week

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New corporate tieups recast
CPI's competitive
lineupp. 21

Overseas marketing poses new promotional problems to U.S. producers .p. 33

Allied's in polyether production; new plant will tap growing urethane market p. 87

Explosives-forming shapes new market for chemical specialtiesp. 93

BLAST FURNACE: NEW CHEMICAL CONSUMER .

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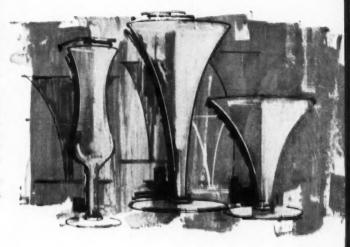
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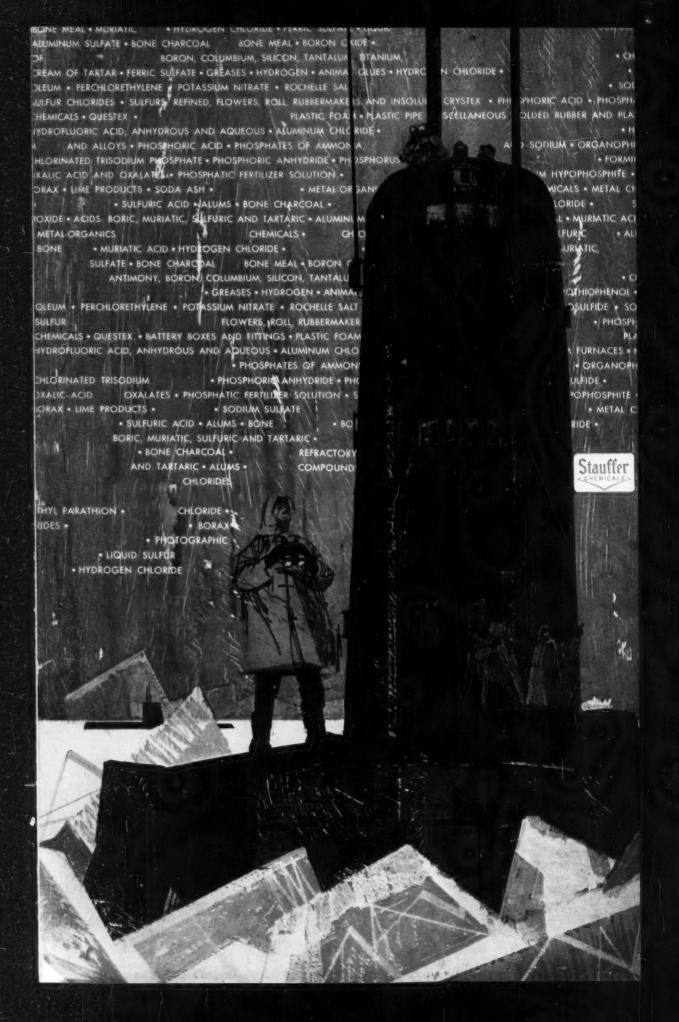
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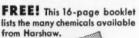
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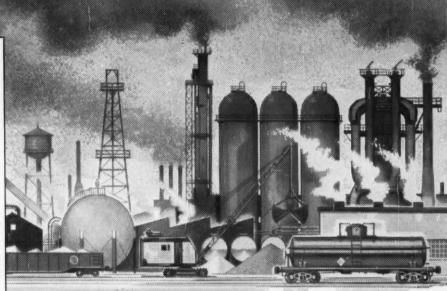
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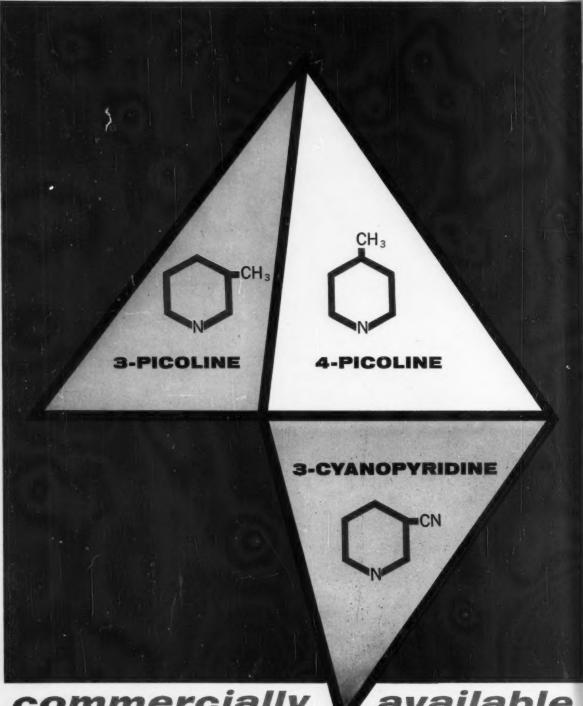
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ON THE COVER: Blast furnaces, such as the one shown here at U.S. Steel's Fairless Works, have always had a monstrous appetite for chemicals-but now their diet is changing (p. 63).



Chemical Week

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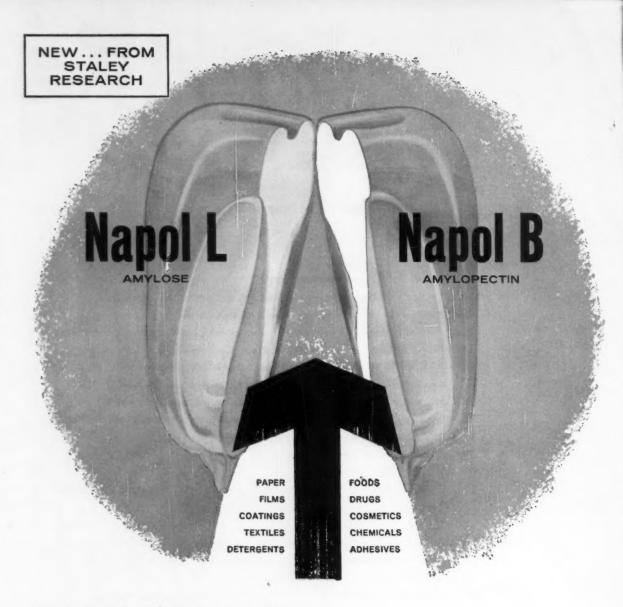
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Time to Lift the Test Ban

ARGUMENTS AGAINST RESUMPTION of U.S. nuclear weapon testing pretty much boil down to worry about world opinion, radiation hazards and the slim hope that the Soviets will stop stalling the test-ban talks in Geneva. Government indecision about the ban was scored recently by a man who helped build the first nuclear bomb, Monsanto Board Chairman Charles Allen Thomas.

In a talk before the Rotary Club in Houston, Thomas called for open tests to be resumed before our lead in nuclear power is jeopardized -a lead, he feels, has been a major deterrent to war. Among his key

• The U.S. had a monopoly on nuclear weapons in '45 but proved it had no intention of forcing its will on the world. Whether Soviet ownership of nuclear leadership would be no threat to the globe is a proposition that Thomas says he "would rather not put to the test."

· "Tests can be carried out underground, so there is no danger of damaging fallout. Another possible method of weapons testing would involve the use of outer space, millions of miles away, with instrumentation rocketed out to radio the test results in code."

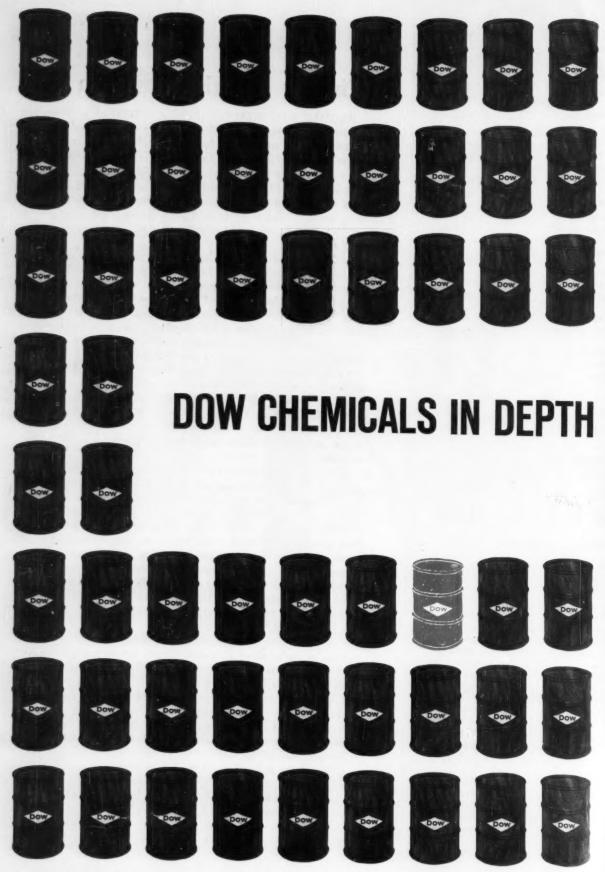
 "Some may argue that we already know how to explode a nuclear weapon, and that further testing is unnecessary. This is not exactly true. We have some pretty good '58 models, but the test ban has kept us from further trials. Whether it is an automobile or a kitchen knife, engineers count on actual tests to prove the true merit of any new design, and complex nuclear weapons certainly are not excluded from this rule.

"The test ban stopped in mid-track a program to develop a 'clean' nuclear bomb that could be used on the battlefield against military targets. Such a bomb would destroy the enemy potential but would have a minimum aftereffect so that the cleared territory could be occupied rapidly by friendly forces. It has been pointed out that we have never actually fired a missile with a working warhead. We need sophisticated new weapons tailored to recent and prospective defense systems, such as a nuclear instrument to detonate missiles in flight toward us while they are still at a safe distance. The yield-weight ratio of missile warheads should be improved so we can boost the deterrent efficiency of our existing rocket supply, which is apparently not the best in the world."

· "An underground nuclear explosion transmits shock waves identical to those of explosions of a chemical nature, and very nearly identical to the shock waves of minor earthquakes. There are several hundred minor earthquakes in Russia every year, and we have no way of discovering whether or not the Russians have resumed their own testing.

"We do know they announced a mysterious new sort of weapon last year, without releasing any details, and later in '60 they saw fit to say that some unusually large chemical explosions had occurred inside their borders."

· "In all the policy shifts of the last 16 years, our nuclear leadership has been our one big stick. We are close to losing it. We must not have another world war. But I believe history shows us that the correct way of preventing war is to be strong."



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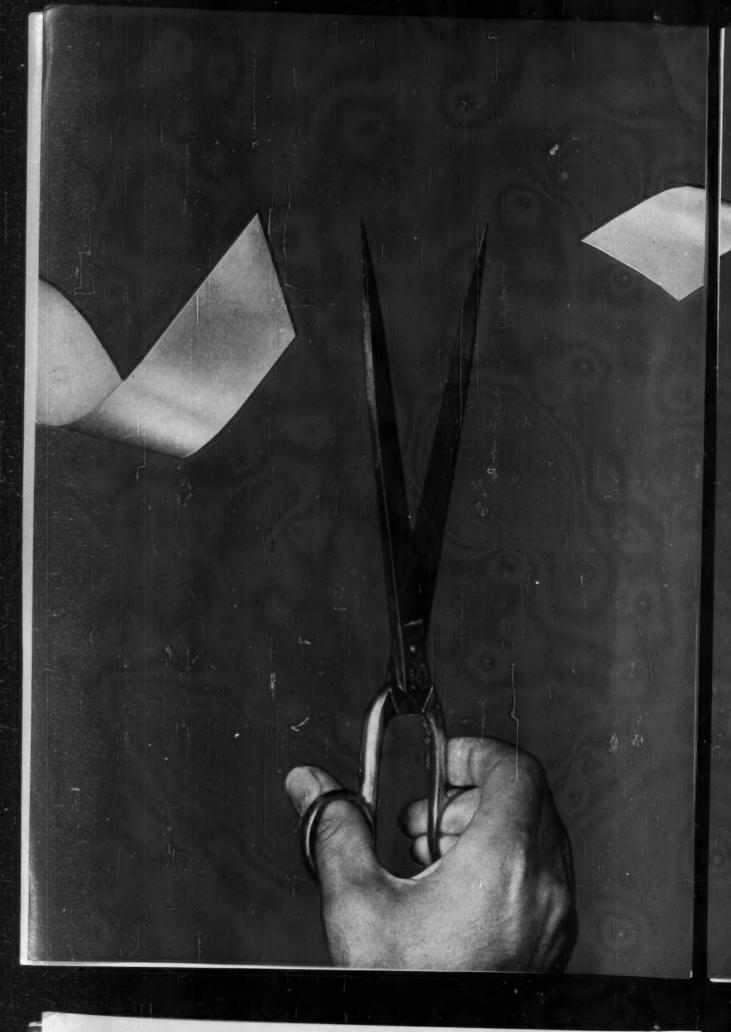
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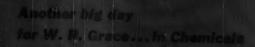
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N. R. Grace & Co.'s Nitrogen Products Division a now productive another 60,000 tons per year of ammonia. The ribbons were cut... the velves of ammonia. The ribbons were cut... the velves were opened, if the start-up buttons were pushed... the test runs have been completed. This process plant start-up marked the completion of Job 1250, and the Chemica plant put into operation on this at above rated capacity. For W. R. Grace & Co. it was, understandably, a bit day. Those familiar with Chemica's record of process an inverting achievements expected no less. They were not at all surprised when this new Grace ammonis plant was placed on strage without difficulty or delay.

Chemico experience pays off for the client in many ways... in more efficient designs, lower specially code, case of start-up and most important... Jover product costs, if your company is considering the emstruction of new or expanded process facilities. Chemico engineers would be pleased to discuss your plans with you, Address all inquiries to: Chemico Sales Department.

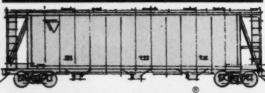
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General American designed its new DRY-FLO CHEM Car to protect plastic resins from contamination and moisture pickup. It is being used by 18 of the major producers of polyethylene, polystyrene and polypropylene. The unique feature which makes this car better than any other for bulk transportation of contamination-sensitive. free-flowing solids is General American's

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LETTERS

More Isocracking

To the Editor: Your article titled "Finding New Dollars in Distillates" and concerned with hydrocracking operations in petroleum refineries (April 29, p. 33) reflects some misunderstandings about the Isocracking process licensed by California Research Corp., a subsidiary of Standard Oil Co. of California.

The article implies that the feed to Isocracking must be limited to 850 F end point. Although current designs specify feedstocks with end points up to 850 F, we do not consider this figure to be a limitation on the process.

The article states: "Basically, Isocracking consists of a unit to remove sulfur and nitrogen compounds from the feed—Cal Research's HDN process -plus catalytic reforming." We think it is better described as a low-temperature, low-pressure hydrocracking operation with pressures ranging from 500 to 1,500 psig. and operating temperatures from 400 to 700 F. The feed to Isocracking usually requires hydrofining pretreatment, and we believe that this can be done must economically using the HDN process, also developed by California Research Corp. Catalytic reforming is not connected with the process except that the 180-400 F gasoline produced by Isocracking does make an excellent cat reformer feed-

In a sense, all four hydrocracking processes included in your story are "very similar" in that they are all designed to perform comparable functions. We believe that your implication that Isocracking is more closely comparable to one of the other processes is misleading.

Your story implies that Isocracking is closely tied to those stocks that are in perennial oversupply in California. On the other hand, the flexibility of Isocracking, we believe, is one of the most important factors in

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y. industry's acceptance of the process. It can be used to produce middle distillates as well as gasoline. It works well in conjunction with other cracking processes, such as catalytic cracking and coking, or it can be used as a replacement for catalytic cracking.

Total Isocracking capacity onstream, building or in the final engineering stages amounts to 28,500 bpd., and we expect that several new plants will be announced in the near future.

A. L. LYMAN
President
California Research Corp.
San Francisco

Patents Described

To the Editor: The recovery of chemicals from sulfite liquor by ion exchanger (CW, May 20, p. 55; June 3, p. 66) is hardly a new development. Your readers may be interested in the fact that considerable patent literature exists on this subject. To list a few: U.S. 2,392,435 (1946) to R. G. Tyler; 2,656,244 (1953), 2,656,245 (1953), 2,710,245 (1955), 2,801,994 (1957) and 2,823,120 (1958), all to Rayonier, Inc.; and 2,736,635 (1956) to Ionics, Inc. All of these patents are described briefly in our recently published "Duolite Ion-Exchanger Manual."

I. M. ABRAMS, Ph.D.
Assistant Technical Director
Ion-Exchanger Division
Chemical Process Co.
Redwood City, Calif.

MEETINGS

Gordon Research Conferences, July 10-14; Colby Junior College, New London, N.H.—textiles; New Hampton School, New Hampton, N.H.—magnetic resonance; problems in research; Kimball Union Academy, Meriden, N.H.—chemistry, physiology and structure of bones and teeth; Tilton School, Tilton, N.H.—chemistry and metallurgy of semiconductors.

Society of Chemical Industry, 80th annual meeting, Oxford, England, July 10-14.

Colorado State University, fourth annual institute in technical and industrial communications, Fort Collins, Colo., July 10-14.

Case Institute of Technology, processcontrol theory course, Cleveland, July 10-29.

National Assn. of Power Engineers, national convention, Sheraton-Gibson Hotel, Cincinnati, July 17-21.



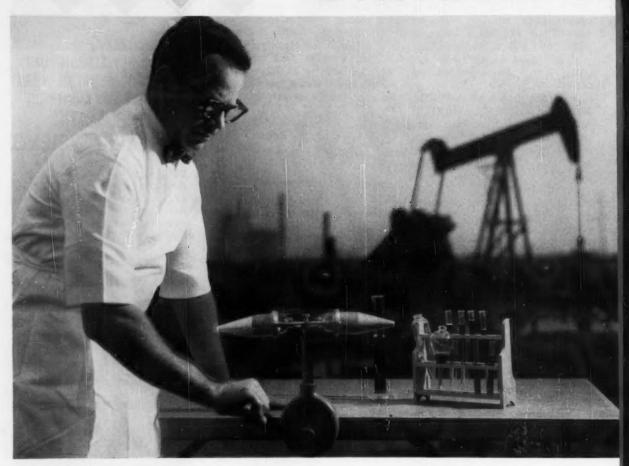
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ETHYLENE OX



Ethylene Oxide and Propylene Oxide provide a better way to separate oil and water

Millions of barrels of crude oil come to the surface in the form of annoyingly stable water-in-oil emulsions. Obviously, you'd never attempt to separate commercial quantities of oil from water with a simple laboratory centrifuge.

There's a better way . . . petroleum demulsifiers, formulated with ethylene oxide and propylene oxide, separate crude oil from water for a fraction of a cent per barrel. Most petroleum demulsifiers are mixtures of highly complex organic compounds. Ethylene oxide and propylene oxide are added to the basic demulsifier nucleus to achieve desired surface-active properties. The ratios of these oxides are varied to adjust the hydrophobe-hydrophile balance. The molecules

are then modified to satisfy individual requirements.

Such custom building of molecules with ethylene oxide and propylene oxide is an established practice. For example, detergent manufacturers react fatty acids, fatty alcohols, fatty amines, and alkylated phenols with ethylene oxide to form polyoxyethylated derivatives which are employed as detergents, dispersants, stabilizers, and emulsifiers.

And propylene oxide finds extensive use in formulating polyether diols and triols for the growing polyurethane industry.

Jefferson is interested in any program involving these oxides . . . let our technical service people help you.

DE and Propylene oxide

ETHYLENE OXIDE

SPECIFICATIONS

Water, wt.%	0.03 max.
Aldehyde as acetaldehyde, wt.%	0.010 max.
Acidity as acetic, wt.%	0.002 max.
Non-volatile residue, gms./100 ml	0.010°max.
Residual odor	None
Color	Water-white
Inorganic chloride as Cl	Nil
Acetylene	Ni

SELECT PROPERTIES

Boiling point, 760 mm	10.73°C.
Explosive limits in air by volume	
Flash point (open cup)	<0°F.
Specific gravity, 20/20°C	0.8711
Specific heat (liquid)	0.44 cal./gm./°C.
Weight, 20°C	7.25 lbs./gal.

PROPYLENE OXIDE

SPECIFICATIONS

Specific gravity, 20/20°C	0.829 min. 0.831 max.
Acidity as acetic, wt.%	0.005 max.
Water, wt.%	0.10 max.
Color, Pt-Co scale	10 max.
Residual odor	None
Aldehyde as propionaldehyde, wt.%	0.05 max.
Boiling range, ASTM, °C	33.0-37.0

SELECT PROPERTIES

Boiling point, 760 mm.	34.1°C.
Explosive limits in air by volume	2.1-38.5%
Flash point (open cup)	35°F.
Specific gravity, 20/20°C	0.8305
Specific heat (liquid)	0.51 cal./gm./°C.
Weight, 20°C.	6.92 lbs./gal.

SHIPPING AND HANDLING

Ethylene oxide and propylene oxide are available from Jefferson in 10,000-, 6,000-, and 4,000-gal. tank cars (I.C.C. Spec. 105-A-100-W) and E. O. in 400-lb. net drums (I.C.C. Spec. 5P), P. O. in 370-lb. net drums (I.C.C. Spec. 17C) . . . red labels required.

Both ethylene oxide and propylene oxide represent a potential hazard in handling and storage. All equipment including piping, storage tanks and relief valves used in the handling of these oxides should be of carbon steel or stainless steel and with a minimum working pressure of 50 psig. Complete methods of handling and precautionary measures are available from our technical service people . . . let them assist you in any phase of your oxide program.

TECHNICAL INFORMATION

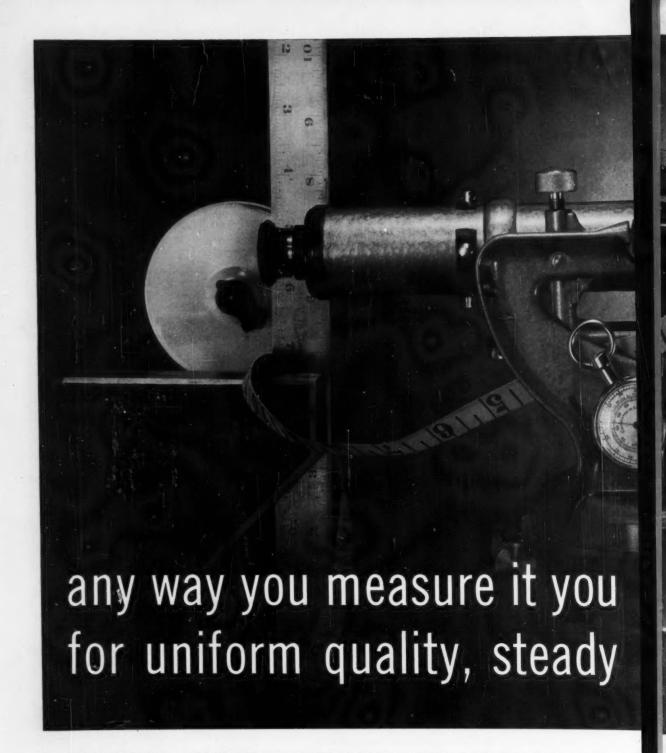
For detailed specifications, applications, storage, handling and bibliography on ethylene oxide and propylene oxide, request the respective Technical Brochures. Also, comprehensive

literature surveys on these two oxides are yours for the asking . . . Jefferson Chemical Company, Inc., 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

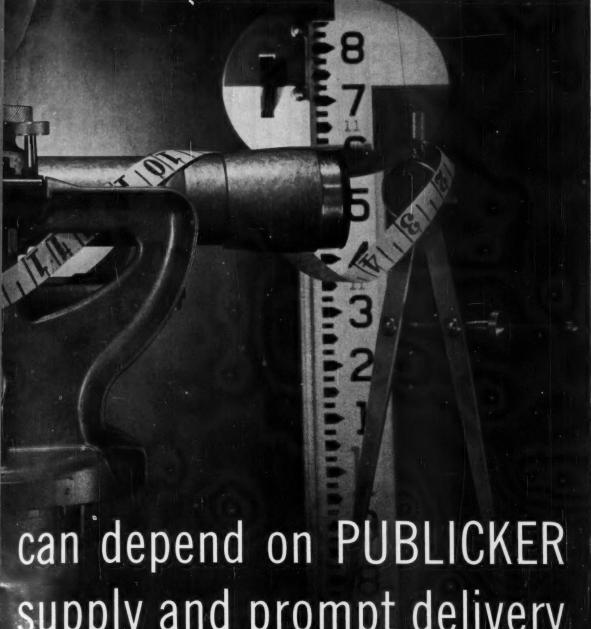


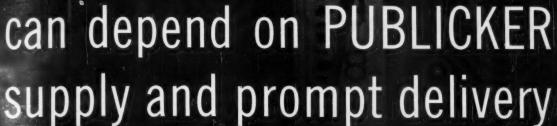


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Business

Newsletter

CHEMICAL WEEK July 8, 1961 Biggest quarter ever for U.S. chemical sales. The rather sad chemical industry performance in the first three months of the year (see p. 23) will be counteracted by brighter preliminary (and unadjusted) Commerce Dept. figures out this week. The data indicates that sales of chemicals and allied products zoomed to a May peak of \$2.65 billion—highest one-month total ever recorded.

With the uptrend apparently continuing through June, secondquarter sales may well top \$7.5 billion, nudge first-half '61 total sales to a cheering \$14.4 billion.

An isocyanate plant for the West Coast. James Fox, Jr., president of Allied's National Aniline Division, early last week disclosed plans for a new, 15-million-lbs./year isocyanate plant for southern California. It will be the West Coast's first isocyanate unit—which reportedly could be readily expanded to 25 million lbs./year. No site has been selected yet, but the company hopes to be in operation next year.

Bulk of the output is aimed at urethane producers in several Western states and Hawaii; some will go for rigid-foam applications, and to national defense and atomic energy programs.

Another polyether plant for Allied? Could be, although the company is mum on the possibility. A Solvay Division polyether plant has just come in at Baton Rouge, La. (see p. 87), but a West Coast plant would be a logical companion unit to the proposed California isocyanate project. Reason: prospective customers for one urethane component would also be in the market for the other essential urethane raw material.

Isocyanates are also getting a big play abroad because of increasing European demand for urethane foams. Late word has it that Du Pont (United Kingdom) Ltd., will start building a "multimillion-dollar" isocyanates unit adjacent to the Du Pont subsidiary's only other manufacturing plant (neoprene rubber), at Maydown, near Londonderry, Northern Ireland.

Until the new unit goes into operation sometime in late '63, European customers will get their isocyanates from Du Pont's U.S. plant.

Meanwhile, in the Netherlands work is nearing completion on a new Du Pont Orlon acrylic fiber plant at Dordrecht, and construction may soon get under way there on a plant to proces Delrin acetal resin.

France's synthetic textile industry will move closer to integration as a defense against increasingly rugged competition among chemical companies in the six European Common Market countries. Latest development: Rhone-Poulenc and Celtex will soon ask stockholders to approve a

Business

Newsletter

(Continued)

merger of the two companies' man-made textile and plastics operations. The merger will also include Rhone-Poulenc's chemical department.

In addition to this tie up, Rhodiaceta (a joint Rhone-Poulenc and Celtex affiliate) will take over the synthetic textile activities of Organico, a Pechiney affiliate.

Diamond Alkali claims victory in the Chemical Process Co. fight. Diamond says it "now has control over a sufficient number of Chemical Process shares" to assure adoption of the Diamond-Chemical Process merger agreement (CW Business Newsletter, June 24). Commercial Solvents—which also sought to acquire the Redwood City, Calif., company—merely says it's "continuing to study its position."

Room at the top. That, apparently, is Cary Chemicals' philosophy when it comes to polyvinyl chloride production. Late last week the company finally okayed a \$14-million expansion program (CW, June 24, p. 43), which, when completed, says President George Blasius, will make Cary the third largest U.S. PVC producer. (Present top three are Union Carbide, Goodrich Chemical and Monsanto.)

Sites of the expansions that will boost Cary's polymerization potential to some 200 million lbs./year—it currently has a 50-million-lbs./year plant at Flemington, N. J.—are still "under study."

It's a good bet, however, considering the company's marketing aims, that one 50-million-lbs./year unit will be built in the Midwest for operation in late '62. The other 100-million-lbs. expansion (probably in two 50-million-lbs. stages) will likely go up in New Jersey.

Reportedly, these latter units (also slated for '62 operation), will be able to turn out emulsion and suspension polymers; this could mean Cary's entry into manufacture of vinyl and copolymer latexes.

Oregon is closer to a new primary aluminum reduction operation. Cerro Corp., which has been probing the feasibility of putting up a 55,000-tons/year plant to be served from the Bonneville Power Administration, has taken an option on 1,030 acres of Wauna Lumber property at Wauna, Ore. Site is about 40 miles upstream from the mouth of the Columbia River. Howe Sound Co. (New York) is also reported to be considering an Oregon aluminum reduction plant (CW Business Newsletter, May 20).

The deal to "Mexicanize" American Smelting and Mining's Mexican holdings is just about complete. Minister of National Properties Eduardo Bustamante has confirmed the report (CW, July 1, p. 19) that Banco Nacional and Bancos de Comercio led a combine to buy 51% of ASARCO's estimated \$150-million Mexican investment.

In past months the company has been consolidating nine separate subsidiaries into one corporate body (Minera Asargo SA), preparing for the partnership called for under the new Mexican mining law.



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Martin's Bunker, Courtaulds' Woods, Bond and Share's Walker: Getting set for big moves into chemicals.

Trio Seeking Chemical Ventures

The chemical industry is still highly attractive to sophisticated investors. Within six days last week three giant companies-up to now preponderantly nonchemical-took steps to greatly increase their chemical operations.

Obvious effect of these moves: further intensification of competitive pressure in the chemical industryultimately, harder fighting for chemical markets, domestic and foreign.

• President George G. Walker of Electric Bond and Share Co. (New York) emphasized to stockholders that both Bond and Share and its 52.6%owned affiliate, American and Foreign Power Co., will be aggressively seeking acquisitions and investments in nonutility businesses this year; and it was made clear that chemicals are considered a particularly inviting field.

• Board Chairman J. Albert Woods of Courtaulds North America (New York) and Director Arthur W. Knight of the parent company, Courtaulds Ltd. (London), were elected to the board of Koppers Co. (Pittsburgh), as the big British textile concern invested an estimated \$4-5 million in Koppers common stock. (Last week Courtaulds for the first time revealed its sales volume: \$481.6 million for the fiscal year ended March 31.) The linkup appears to be aimed at a series of new ventureson both sides of the Atlantic-in "a number of fields where technical, process or production know-how might be exchanged to mutual advantage of the two companies."

· Board Chairman George M. Bunker of The Martin Co. (Baltimore) was designated as prospective chairman and president of a big new company that would be formed through merger of missile-making Martin and American-Marietta Co. (Chicago), producer of paints, resins, adhesives, construction materials and other products. Martin's interests include solid propellants, electronics, nucleonics, and chemical, physical and metallurgical research.

Pulling out of Power: For Electric Bond and Share, now released from the restrictions of the Public Utility Holding Company Act of 1935, the new drive to shift from utility to manufacturing investments will be handled by various Bond and Share units.

EBS Development Corp. has been organized as a new subsidiary with \$10-million initial capital and a mission to "acquire, manage and develop manufacturing and other nonutility businesses" - especially those with "outstanding growth characteristics." Bond and Share stock will also be available for such acquisitions.

While propositions relating to chemical companies will be particularly welcome, says Senior Vice-President Lester Ginsburg, any chemical ventures acquired would probably be joined to Escambia Chemical Corp. (owned 50-50 by Bond and Share and United Gas Corp.), rather than to EBS Development.

American and Foreign Power which sold its electric power facilities in Argentina and Mexico and started negotiations for a similar sale in Colombia - also is oriented toward chemicals; it has already invested in aluminum, carbon black and petrochemical ventures in South America. And, in addition, Bond and Share has added nearly \$5 million worth of chemical and drug company securities to its investment portfolio over the past year.

Three-Year Quest: Courtaulds which up to '41 was 95% owner of American Viscose Corp.—has been scouting for a connection with a U.S. chemical company for at least three years (CW, July 26, '58, p. 41). One probable upshot of the new tieup: use of Koppers processes for production of plastics in Britain.

Martin - headed for nearly 50 vears by the late Glenn L. Martin. aviation pioneer who founded the company in 1907-ended its aircraft business last Dec. 20 with delivery of its final Marlin flying boat to the U.S. Navy. Nearly all of its sales are under defense contracts or subcontracts. The proposed merger with Marietta would create a company with nearly \$1billion/year sales-about 40% of which would be in non-defense business. Growth in chemicals is foreseen in the combination of Martin's depth in fundamental research and Marietta's broad experience in marketing of chemical end-products.

Each of these three big corporate moves, in fact, could lead to any number of new chemical expansion projects over the next few years. Keen as competition is now in most chemical lines, the outlook is for even sharper rivalry for growing markets.

New Argentine Lures

In an effort to breathe life into Argentina's long-ailing economy, the government is offering a series of new concessions to foreign investors. Argentina's economics minister, Robert T. Alemann, tells Chemical Week: "Economic policy regarding investment is to go all out for private or mixed foreign capital investments in steel and petrochemicals."

To encourage these investments, two decrees have just been passed to implement the Industrial Promotion Law. They provide these new concessions: tax deductions of up to 100% (depending on level of production in the industry); accelerated depreciation of machinery; full tax exemption on technical aid money from abroad; no tax on earnings of stock sold abroad to finance essential industries; easy terms for tax payments in cases of transfer of firm from one owner to another; free importation of machinery and equipment for approved industries; and wherever possible, the state will sell raw materials to favored industries at special low prices.

One of the first petrochemical ventures to benefit from the new regulations is slated to go into construction in September. This project—280 miles north of Buenos Aires—is being billed as Latin America's largest petrochemical complex (CW, Jan. 7, p. 23). Cost: \$70 million. To be built by Petroquimica Argentina (the Fish Group), it is expected to have all nine plants (synthetic rubber, plastics and fiber raw materials) in operation within three years.

Cashing In on Corn

Industrial starches, dextrines and other industrial products account for about half of Corn Products Co.'s nearly \$700-million/year sales volume, company chairman William T. Brady pointed out last week.

"Diversity is implicit in corn," he told New York security analysts, "and . . . we produce some 500 industrial products for 60 basic industries."

Replying to a stockholder about A. E. Staley Co.'s new process for separating high-purity amylose and amylopectin from ordinary dent corn, Vice-President Robert G. Ruark stated that amylose will be a significant new market entity. But he thinks it will be slow to grow and that Corn Products will be in the competition. To another questioner, inquiring about drug opportunities, Brady declared, "We favor the nutritional rather than the medicinal approach."



Corn Products' Brady: Heavier sales to industry; no switch into drugs.

Park for Atomic Plants

New York state's Office of Atomic Development is pushing ahead with plans to establish an "atomic industrial park" in the western part of the state. It has acquired a 3,331-acre site in Cattaraugus county, about 35 miles south of Buffalo, and is collecting information needed for an Atomic Energy Commission license.

The project, known as the Western New York Nuclear Service Center, will provide for storage of nuclear fuels, by-products and wastes, and related industrial activities. Agency Director Oliver Townsend expects that \$50 million worth of privately owned facilities will be constructed at the site in the next decade.

So far 25 companies have shown interest; three are considering a joint venture to build an atomic fuel reprocessing center (cost: \$25 million). According to Townsend, 250 days of processing would be needed each year for economical operation. Nuclear plants now onstream or nearing completion would provide about 227.

"What we need to make this thing really go," says Townsend, "is another atomic power plant in the state." One possibility is offered by the Empire State Atomic Development Associates—a group of seven utility companies. ESADA is now studying two development projects. If results—due in three years—are favorable, the group will build a nuclear power station with 300-500-Mwe. capacity.

A-Plant Wins on Cost

Pacific Gas & Electric plans to build an atomic plant that will supply electric power to the San Francisco area at less cost than could a comparable conventional steam plant (CW, June 24, p. 41).

The 325-Mwe. reactor and steam system, to be built by General Electric, will be located at Bodega Bay, 50 miles north of San Francisco. Estimated power-production costs will be 5.62 mills/kwh. at the bus bar, compared with 5.77 for an oil-fueled system in the same area.

If all clearances arrive on schedule, construction will begin in Aug. '62. Completion target: late '65. PG&E will receive no government subsidies or outside help. Cost: \$58.8 million—\$181/kilowatt.

New Government Data Profile the 'Bottoming-Out'

(All dollar figures in millions. Sources: Securities & Exchange Commission, Federal Trade Commission.)

	SALES			EARN	INGS		PROFIT RATIOS		
Industry Category	First Qtr. '61	from	inge First '60	First Qtr. '61	from	inge First . '60	First Qtr. '60	First Qtr. '61	
CHEMICAL PROCESS INDUSTRIES				i de					
Chemicals and allied products	\$6,481	Down	2.9%	\$421	Down	17.0%	7.6%	6.5%	
Basic chemicals	3,037	Down		226		19.3%	8.9%	7.4%	
Pharmaceuticals	1,020	Up	2.3%	96	Down	7.7%	10.4%	9.4%	
Paper and allied products	2,918	Up	0.3%	121	Down	15.4%	4.9%	4.1%	
Petroleum refining, related industries	7,710	Up	3.4%	778	Up	13.6%	9.2%	10.1%	
Rubber and miscellaneous plastics	1,936	Down	6.5%	56	Down	29.1%	3.8%	2.9%	
Primary nonferrous metals	2,159	Down	10.1%	104	Down	26.2%	5.9%	4.8%	
Stone, clay, glass products	1,859	Up	1.8%	44	Down	52.2%	5.0%	2.4%	
CPI TOTALS	23,063	Down	1.2%	1,524	Down	7.5%	7.1%	6.6%	
ALL MANUFACTURING INDUSTRIES	82,592	Down	3.7%	2,900	Down	27.4%	4.7%	3.5%	

Changes in Balance-Sheet Items -March 31, '60, to March 31, '61

Industry Category		quid sets*	PI	Property, ant and uipment		ort-Term .oans		ng-Term Debt**	h	Stock- olders' Equity		rking pital†
CHEMICAL PROCESS INDUSTRIES												
Chemicals and allied products	Down	10.8%	Up	7.6%	Up	39.8%	Up	2.9%	Up	5.2%	Down	0.1%
Basic chemicals	Down	17.2%	Up	7.1%	Up	12.2%	Up	1.7%	Up	5.1%	Down	2.6%
Pharmaceuticals	Up	1.4%	Up	10.2%	Down	10.5%	Up	17.7%	Up	6.2%	Up	4.7%
Paper and allied products	Down	10.7%	Up	10.4%	Down	22.2%	Up	11.8%	Up	8.2%	Up	5.5%
Petroleum refining, related industries	Up	3.4%	Up	3.6%	Down	51.0%	Up	3.5%	Up	4.8%	Up	4.3%
Rubber and miscellaneous plastics	Down	7.7%	Up	9.6%	Up	25.5%	Up	14.3%	Up	4.2%	Up	2.4%
Primary nonferrous metals	Down	13.8%	Up	3.7%	Up	40.3%	Up	6.6%	Down	2.8%	Down	0.6%
Stone, clay, glass products	Down	12.0%	Up	14.7%	Up	50.0%	Up	30.5%	Up	8.5%	Up	5.5%
CPI TOTALS	Down	5.7%	Up	6.2%	Up	20.0%	IJр	7.1%	Up	4.7%	Up	2.5%
ALL MANUFACTURING INDUSTRIES	Down	6.5%	Up	3.7%	Up	8.4%	Up	7.4%	Up	4.1%	Up	2.0%

* Cash on hand and in bank, plus U.S. government securities.
** Includes installments due in one year or less, † Excess of current assets over current liabilities.

Picture of a Bad First Quarter

Tabs on how hard the chemical process industries were hit in the worst part of the '60-'61 recession came last week, just as company executives were beaming over a greatly improved second quarter.

Data compiled by the Securities & Exchange Commission and the Federal Trade Commission show that for most CPI segments—as well as for industry in general—this year's first quarter was in many respects the worst since the first three months of '58, the bottoming-out of the '57-'58 downturn.

Profit ratios tumbled, there was a

more than seasonal drain on liquid assets, and there was an abnormal flurry of short-term borrowing to cover taxes and other obligations.

For makers of chemicals and allied products, the two depth-of-recession periods were practically a standoff in low profitability; in each of those two quarters, annual rate of return on stockholder's equity sagged to 9.8%, compared with '59's average of 13.7%.

At least two other industries found the going even rougher in the latest economic storm. For makers of pulp and paper products, annual rate of return on equity in this year's JanuaryMarch period was 6.6%, compared with 7% at the bottom of the previous recession and 9.5% in '59. For nonferrous metals producers, the first-quarter '61 rate of return was only 2.9%, vs. 3.4% in '58.

Despite the then slim profits in the first '61 quarter, CPI companies did not skimp on dividends or new investments. Although CPI earnings were down 7.5% from the yearago period, cash dividend payments were up 2.8%, to \$913 million; and capital expenditures for new plant and equipment were unchanged at \$1.28 billion.



Saudi Arabia's Tariki: Arabs must integrate or remain underdeveloped.

Pushing for Arab Unity

Prospects for Arab economic cooperation—which could bring integration of the Arab nations' budding petrochemical industries — seemed dimmer than usual last week. One day after the Arab League Economic Council meeting in Damascus broke up with virtually no progress toward cooperation, Iraq's Premier Kassim boldly asserted that he was absorbing oil-rich Kuwait, which had become independent from Britain a few days earlier.

The week's events demonstrated that the Arab world's deep-rooted political rivalries far outweigh its urge toward economic unity.

The lure of Kuwait's \$400-million/year oil revenues explains part of Kassim's motive for trying to grab the Shiekdom. But political reasons also underlie his move, which practically no one expects will succeed.

Kassim's prime objective is to stem the spreading influence of United Arab Republic President Nasser. By laying claim to Kuwait, he seeks to prevent its entry into the Arab League and the channeling of some of its wealth into oilless Arab lands-notably Egypt.

But by evoking support for Kuwait from Nasser and other Arab leaders, Kassim's play seemed to have precisely opposite the effect he intended.

Conflict Over Unity: Kassim's strategy of trying to block U.A.R.-sponsored moves toward Arab economic, and eventually political, union clearly showed itself at the Arab League Conference.

Discussions centered around three proposals for economic cooperation. The U.A.R. advocated full economic union, under an Arab Economic Unity Council headquartered in Cairo. It would have full power to dictate the economic, fiscal, industrial trade, and agricultural policies of each Arab state.

While most Arab states represented at Damascus were either lukewarm toward the proposal or dead set against it, Saudi Arabia's Oil Minister Sheikh Abdullah Tariki, came out all for it.

Actually, full economic integration might hinder Saudi Arabia's own industrialization plans. But both Nasser and Tariki maintain that the Arab states must integrate to protect themselves from the potential threat of the European Common Market and similar groupings. Unless the Arabs achieve economic unity now, Tariki says, they'll remain "a source of cheap raw materials to feed the industries of other nations."

Such a union, of course, would put Nasser in a strong position to become the "man in charge" in the Middle East.

Iraq countered with a proposal for a "complementary and coordinated economy for the Arab states" with headquarters in Baghdad. It would gradually achieve free trade and economic cooperation without coercion.

Lebanon, which has a full freeenterprise economy, called for Arab states (meaning the U.A.R. in particular) to first abolish legislation discriminating against business activities of other Arab states; it then wants an agreement for a free flow of capital, men, and goods, as first steps toward full integration.

Lebanon would have backed Iraq's proposal, but didn't because the U.A.R. refused to support any integration move except its own.

The result was that no agreement

was reached, and the whole subject was again put off—this time until the Arab League meeting in Casablanca next September.

There's little hope that much will be achieved then, either; a welter of conflicts stand in the way of real integration. Most Arab states fear the U.A.R.'s economic and political aims in the Middle East. Besides political domination by Nasser, they fear that Egypt's new factories could swamp their own less-developed industries. Most Arab states espouse free enterprise or moderate socialism, and they fear Nasser's more absolute brand of socialism. Nasser, in turn, finds a liberal trade union incompatible with his rigidly controlled economy.

Bits of Progress: Nevertheless, there are some signs of progress in the Arab world. The Arab Tanker Co., headquartered in Kuwait, was set up in April. It's still a paper project, but has a reasonable chance of success. More important is the Arab Monetary Fund for Economic Development (AMFED), off to a slow start with a \$56-million capitalization. Both plans might be hurt if Kassim could succeed in grabbing Kuwait, since the latter has pledged up to \$14 million to the development fund and promised an important financial contribution to the tanker

Petrochemical Merger? Meanwhile, CW's Beirut correspondent learns that a proposal to integrate the various Arab petrochemical projects will be made at the Third Arab Petroleum Congress in Cairo next October.

It will be presented by Mounir Attiyah, administrator of the Lebanon Industry Institute, an independent industrial research and development corporation with activities all over the Middle East.

Attiyah will present a paper calling for formation of: an inter-Arab petrochemicals development corporation to plan petrochemical projects and coordinate production; a joint export agency to act as the exclusive representative of Arab producers abroad. International petrochemical corporations would be asked for technical and marketing help.

Since petrochemicals are still an almost virgin industry in the Middle East, Attiyah thinks integration is still possible.

national roundup

Rounding out the week's domestic news.

Companies

Reichhold Chemicals (Wh² Plains, N.Y.) will distribute a 2% stock dividend along with its regular 15¢ quarterly cash dividend on common stock, payable Aug. 15. This is the fourth consecutive year for the 2% August stock dividend. The cash dividend is to be waived on 1.25 million shares, most of which are held by company President H. H. Reichhold.

Honolulu Oil Corp. (San Francisco) will hold a special stockholders' meeting July 10 to complete transfer of all assets to Tidewater Oil Co., Albantu Oil and Gas Corp., Pan American Petroleum Corp., Mon-Dak Oil Corp., and several other companies. Stockholders will receive about \$379.7 million, \$101.28/share.

Ster-O-Matic, Inc. (Mundelein, Ill.), has been launched as a jointly owned subsidiary of Indianapolis Water Co. and Philadelphia Suburban Water Co. The new firm will manufacture a complete line of water-treatment products. W. R. Grace & Co. (New York) will distribute these products abroad. Joint research ventures also have been arranged with American Machine and Foundry (New York) and American Smelting and Refining (New York). Products will include systems for treating boiler water, destroying bacteria in canned foods, and controlling plant diseases. Research will be done on desalting of sea water.

Expansion

Mineral Products: Duval Sulphur and Potash Co. (Houston, Tex.)—owned 75% by United Gas Corp. (Shreveport, La.)—has budgeted more than \$3 million for capital expenditures in '61. Development work is proceeding on sulfur properties in Texas, copper and molybdenum deposits in Arizona, and potash minerals—including a company-owned stratum of langbeinite (potassium and magnesium sulfates)—in New Mexico.

Sulfur, LPG: Construction of two natural gas processing plants for Shell Oil Co. is under way at Sealy and Bryan's Mill, Tex. The Sealy plant will extract up to 21,000 gal./day of liquefied products from 15,000 mcf. of natural gas; the Bryan's Mill plant will recover up to 130 long tons/day of sulfur and 5,600 bbls./day of LPG hydrocarbons from 30,000 mcf. of natural gas. Both plants are to be onstream this fall.

Oxygen: Linde Division of Union Carbide Corp.

(New York) is constructing a 280-tons/day oxygen plant (estimated cost: \$3 million) to supply 99.5% pure gaseous oxygen to the Campbell Works of Youngstown Sheet and Tube Co. Linde now operates a 30-tons/day unit on the site. New facilities are due onstream early next year.

foreign roundup

Rounding out the week's international news.

Asbestos: Jefferson Lake Asbestos Corp., subsidiary of Jefferson Lake Sulphur (New Orleans), has started construction of its 2,500-tons/day asbestos mill in Calaveras County, California. The \$5-million operation is scheduled for completion next March.

Petrochemicals/Spain: Dow Chemical Co. is planning to construct a petrochemicals plant at Somorrostro, near the port of Bilbao. The plant, due onstream by early '63, will have annual capacity of 10,000 tons of high-pressure polyethylene, 6,000 tons of low-pressure polyethylene, 8,000 tons of polypropylene, and 12,000 tons of styrene.

Magnesium Carbonate/Israel: Continental Ore Corp. (New York) and Harbison-Walker Refractories Co. (Pittsburgh) have teamed with Israel's Dead Sea Co. of Sodom to construct a \$7.5-million magnesite plant on the coast of the Dead Sea. The new company, owned 50% by the Israeli interest and 25% by each of the American concerns, will produce 75,000 tons/year of magnesite, mainly for export. A 1-ton/day pilot plant is now in operation; the main unit is due to begin operation some time next year.

Citric Acid/Union of South Africa: A \$1-million citric acid plant is to be built on the Natal north coast near Durban by a so-far-unnamed German concern. Plans call for use of molasses as the raw material. Capacity was not disclosed, but output is expected to satisfy the country's needs, with a surplus for export.

Pharmaceuticals/England: Mead Johnson & Co. (Evansville, Ind.) is getting a 35% voting interest in British Drug Houses Ltd. in return for making available about \$14 million over the next five years. The British firm will use the funds to repay bank loans and finance further development. BDH is pinning its hopes on an inexpensive oral contraceptive, now being clinically tested. If tests are successful, a decision to market may be made some time next year. The association with Mead Johnson is expected to provide access to "large new markets."



Typical arbitration panel is selected from volunteers listed with the American Arbitration Assn.,

Keeping Commercial Disputes Out

CPI companies that tangle over licensing agreements, sales contracts, and the like, are turning more frequently to voluntary arbitration as the quickest, cheapest, least-publicized means of settling disputes. Latest data from the American Arbitration Assn. (New York) underscores this trend.

According to AAA—a 35-year-old, nonprofit, private organization founded to study, perfect and administer arbitration — most major chemical companies* are now included in its membership. They pay a minimum membership fee of \$125/-year, more if they desire. Individual members pay \$40/year. AAA says companies in the chemical process industries are its heaviest contributors.

Last year AAA provided arbitrators for 1,464 nonlabor cases (double the total in '55), of which a sizable percentage concerned the CPI. AAA does not, at present, give details either of membership or of case statistics.

Settling Out of Court: More than 21,500 commercial (nonlabor) cases were settled through arbitration in all industry last year, up threefold over

'55. (About 300,000 civil cases ended in verdicts in state and federal trial courts.)

CPI companies' arbitration cases were far fewer than cases applying to insurance, railroad, auto; and textile firms. Insurance and other associations also arrange for arbitrators in commercial disputes.

But chemical processors have no arbitration association of their own. Instead, they depend heavily on AAA. Companies agree to submit disputes to one or more arbitrators (three are usually used) who hear evidence, render decisions, much as would the courts.

Arbitrators must be acceptable to both sides, are drawn from AAA's file of 13,000 eligibles in 1,600 U.S. cities. In commercial cases, arbitrators contribute services without charge.

Arbitrators are not bound by the strict rules of evidence that prevail in the courts. But the awards are enforceable in court. (An award can be overturned if there is evidence of misconduct or fraud on the part of an arbitrator, an occurrence said to be "virtually unknown.")

Case in Point: Sometimes even the loser "wins" in an arbitration case.

A vinyl film maker investigated, then bought an embossing machine. The sales contract contained a licensing agreement requiring the payment of royalties to the machine's manufacturer. The royalty depended on the quantity of film embossed, so the licensor required monthly reports on film production. When the machine was installed it did not emboss properly; representatives of the manufacturer could not improve its performance; and the film maker abandoned its use, the monthly reports, and ceased paying royalties. The ensuing dispute was heard by three arbitrators selected from AAA panels-the president of a chemical company, a chemical engineer and a lawyer.

During the hearing, it developed that the vinyl being processed was of poor quality and was printed with ink that attracted dust, a combination that clogged the equipment. The plastics company was directed to pay royalties according to the purchase agreement. But the company also learned some facts on quality control to help it operate more efficiently.

Fast Action: Speed featured the settlement of recent AAA arbitration between Company A (AAA won't

^{*} Among them: Du Pont, Monsanto, Dow, Pennsalt, Atlas, American Potash, Chemstrand, Rohm & Haas, Olin, Carborundum, GAF, Harshaw, Minnesota Mining.



includes experts in several fields.

of Courts

disclose either names or awards; hearings are closed) that supplied formulas and equipment for producing cleaning compounds to Company B, which in turn paid royalties. Company B began producing other items similar to those specified in the licensing agreement and also developed new equipment. Question: Were the new products and equipment also subject to royalty payments? Some were, some were not, the panel ruled. Total time elapsed from the date the demand for arbitration was filed: one month, three weeks, six days.

Matter of Discretion: Privacy of arbitration was much appreciated by a nationally known cosmetic manufacturer forced to withdraw its face powder from the market because of complaints that the powder caused skin eruptions. It accused a supplier of shipping adulterated material, in turn was accused of faulty processing. The arbitrators (a cosmetic chemist, an attorney, and a drug and cosmetic consultant) fixed damages but avoided publicity.

Acid Test: One firm's stockholders never learned of the management error of one acid maker. The company had contracted to supply a particular acid on a yearly basis to another firm. Purchases were to be made in approximately equal monthly installments, although no specific monthly requirement was cited. For several years both parties fulfilled the contract. Then, one month, the buyer refused to accept delivery or pay for the acid. The seller, however, made no move to seek an explanation until almost a year had gone by, then demanded arbitration according to the standard clause in the sales contract in question.

But the purchaser, now buying acid elsewhere, declared that the seller had by now relinquished its contract and abandoned rights under it. Moreover, the vendor had been selling the same acid to firms competing with the buyer at prices lower than that specified in the contract with the buyer.

Arbitrators ruled that the seller was entitled to damages but was not free of fault. The amount of damages awarded took into consideration the seller's delay in asserting its claim and failure to attempt to dispose of the product when the buyer refused delivery. (In contract law, the plaintiff owes a duty to the defendant to make a reasonable effort to avoid or to minimize damages.)

Not for All: Even arbitration's most vigorous proponents do not consider it a panacea. Court judgments (or other court action) are considered preferable in cases involving statutes of limitations or fraud, for example.

Court congestion, however, assures the continued growth of commercial arbitration. In the months that it may take a case to come to trial, the plaintiff may enter bankruptcy.

And arbitration has some less-obvious benefits, according to Paul M. Herzog, executive vice-president of AAA, and former chairman ('45-'53) of the National Labor Relations Board. Since arbitration requires the consent of all parties involved, it tends to foster democratic concepts, he says, and keeps government intervention at a minimum. The lay judges (arbitrators) learn that "few issues are black or white," and they become better equipped to "participate in public decisions as citizens." Herzog adds: "It is better to gain acceptance than to compel obedience, to win consent than to command."

Fluoridation 'Clincher'

Tennessee's first study of children who drank fluoridated water all their lives shows they are far less vulnerable to tooth decay than children who drank nonfluoridated water. The State Health Dept.'s dental division views the results as a strong argument for fluoridation.

The study disclosed that children of Trenton, Tenn., where drinking water is nonfluoridated, have four times as many tooth defects as children of neighboring Milan, Tenn., which fluoridates its water.

Milan children (there were 111 children, 6 to 10 years old, in each test group) had a "DMF" rate of 0.59 vs. 2.49 for the Trenton group. And Milan 6-year-olds showed a continuing decline in the DMF rate. DMF is a dental term for the number of decayed, missing or filled teeth per person. Only permanent teeth of children are considered. Dr. Mark Owens, West Tennessee regional consultant to the dental division, conducted the study.

Milan began adding sodium fluoride to its municipal water supply in March '51, after spending \$1,200 for equipment. Cost of the chemical is about \$1.30/day.

Since Milan's pioneering, 51 other cities and towns have followed suit. Among the large cities, Memphis, Jackson and Knoxville still use unfluoridated water. "More than 1 million of the 2 million Tennesseans who drink water from approved water systems get fluoridation now," said Dr. Carl L. Sebelius, director of the State Health Dept.'s dental division.

Sebelius and Owens say one reason why some cities still do not have fluoridated water may be that "the weight of public opinion has not been strong enough to overcome the objections of a few persons whose influence outweighs their numbers."

In areas unfluoridated, many parents take their children to dentists for application of the chemical directly on the teeth. While this topical application has proved effective, Owens says, there are two schools of thought among dentists about whether greater benefit is derived from fluoride taken internally or from fluoride applied directly. He favors water fluoridation.

Metal Makers' Stand

A recommendation that ores rather than processed metal be bartered for agricultural surpluses has been forwarded to Secretary of Agriculture Orville Freeman by Manufacturing Chemists' Assn. President John E. Hull.

Hull's letter commended Freeman's action in calling on industry representatives to suggest revisions in barter procedures (through the Barter and Stockpiling Division of the Bureau of Foreign Agricultural Service). But he pointed out that MCA's 40-50 members making metals and metal chemicals feel that domestic and foreign economic conditions necessitate a change in the rules "to utilize domestic processing facilities."

Titanium sponge (from Japan), ferromanganese (India), ferrochromium (France, West Germany, etc.), manganese (Japan), chromium (United Kingdom, etc.) imports could be affected. Under the present setup, U.S. swap arrangements have occasionally led to foreign plant expansion, while U.S. processors operate at less than capacity, MCA says. Notes MCA: it takes 100 lbs. of chemicals to make 1 lb. of beryllium, 40 lbs. to make 1 lb. of zirconium.

LEGAL

Union Sued: Damage suits totaling \$370,000 have been filed in circuit court in Birmingham, Ala., against International Chemical Workers Union and Local 308 by 37 former members. The plaintiffs ask \$10,000 each, charge the union with failure to pay strike benefits as specified in the contract, and other violations. They claim that while they were employed by United States Gypsum Co., the union called a strike May 25, '60. Two months later, the suit charges, the union informed the members that the strike was unauthorized and advised the strikers to make individual arrangements with the company concerning employment. The men claim that failure of the union to fulfill the contract by continued payment of strike benefits and representation caused them hardships and deprivation.

Turps Tussle: Directors of American Turpentine Farmers' Assn. Coop-

erative, meeting at Valdosta, Ga., resolved to fight federal efforts to label turpentine as poison. A delegation will go to Washington to confer with the Food & Drug Administration, which has proposed that turpentine be labeled with a skull and crossbones. Downey Musgrove, manager of the association, claims the poison label would limit use of turpentine to industry, greatly reducing its price, whereas turpentine has been used for hundreds of years as a household remedy.

LABOR

Settlements: Members of Local 968, United Brick and Clay Workers (AFL-CIO), ended a 34-day strike at H. K. Porter Co.'s refractories plant in Pascagoula, Miss., after agreeing on a new one-year contract. Terms of the settlement were not disclosed, although prior to the settlement a company spokesman said the firm had offered wage and fringe benefit increases totaling 17¢/hour and that the union was seeking a package of about 30¢/hour.

- A new two-year contract between Local 390 of the United Papermakers and Paperworkers Union and Mohawk Paper Mills, Inc. plants in Cohoes and Waterford, N.Y., calls for a 7¢/hour increase the first year, and an additional 8¢/hour effective May '62.
- Latex Fiber Industries, Inc. (Beaver Falls, N.Y.), and Local 926, International Brotherhood of Pulp, Sulphite and Paper Mill Workers (AFL-CIO), have agreed on a new one-year contract that provides for wage increases ranging from 5 to 11¢/hour.

KEY CHANGES

M. L. Rosenberg to president, Neches Butane Products Co. (Port Neches, Tex.).

Bernard W. Brooks to president and member of the board of directors, Sheffield Plastics, Inc. (Sheffield, Mass.).

Robert W. Lear to vice-president marketing, The Carborundum Co. (Niagara Falls, N.Y.).

Carl Smith to vice-president industrial chemicals marketing, Wyandotte Chemicals Corp. (Wyandotte, Mich.).

Carlos A. Kolungia to general manager of all operations in Argentina for The Dow Chemical Co., and president of Dow subsidiary, Dow Quimica Argentina S.A. (Buenos Aires).

Frederick C. Kroft to staff assistant to the president, Haynes Stellite Co. (New York), division of Union Carbide Corp.

M. W. Carlson to comptroller, Firestone Steel Products Co., division of Firestone Tire & Rubber Co. (Akron, O.).

Lamar P. Bupp to manager, General Electric's Vallecitos Atomic Laboratory (Pleasanton, Calif.).

William F. Aylard to vice-president, Chase Brass & Copper Co. (Waterbury, Conn.), a subsidiary of Kennecott Copper Corp.

Henry B. Hass to director of chemical research, The M. W. Kellogg Co. (New York), a subsidiary of Pullman, Inc.

Herman S. Preiser to president and technical director, Chemionics Engineering Laboratories, Inc. (Bala-Cynwyd, Pa.), electrochemical firm.

Burton W. Graham to vice-president marketing, Collier Carbon and Chemical Corp. (Los Angeles).

William S. McChesney, George B. D. Peterson, Samuel J. Simmons, Jr., and William K. Unverzagt to vice-presidents, Aluminum Co. of America (Pittsburgh).

William T. Egan to general manager, Yuba Manufacturing Division (Benicia, Calif.), Yuba Consolidated Industries, Inc., manufacturer of steel plate products for the chemical process industries.

Allen D. Dorris to vice-president and director, Oakley M. Turner to vice-president, Walter A. Terpenning to treasurer, Sohio Pipe Line Co.

Eugene Daniel Powers to president and director, Components Corp. of America (Mt. Carmel, Ill.).

ASSOCIATIONS

Simon Askin, president, chief executive officer and director of Heyden Newport Chemical Corp. (New York), has been elected president of Armed Forces Chemical Assn. (Washington, D.C.).



"It's here my friends, new improved Varsol...the solvent with long-lasting freshness. Produced by a unique, new Esso hydrofining process, today's Varsol retains its efficient solvency, yet keeps its fresh, sweet smell locked in...even after long storage or many processings in your plant. Like all Esso solvents, new improved Varsol reaches your plant fresh, uniform, and on schedule from modern, conveniently located storage facilities. Don't hesitate to call on your local Esso Representative for further information and expert technical assistance. Or write: 15 West 51st Street, New York 19, New York. (And tell 'em Nosey sent you!) "Nosey"

HUMBLE OIL & REFINING COMPANY









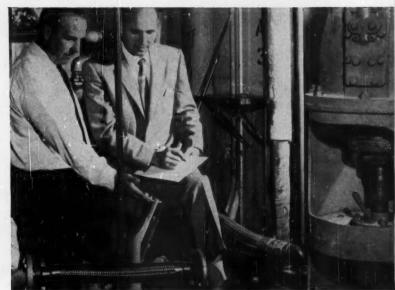
Fexbore pH and viscosity recorders installed on process control panel in a large chemical plant.

from Foxboro...

the analyzers...the electro-chemical to help solve your



Laberatory chemists at Foxboro "sample" customer's process fluids to determine dielectric constant and conductivity.



Foxboro Field Engineer is on hand for his customer's all-important start-up day.

know-how...the engineering service process analysis problem!

pH, conductivity, amperometry, dielectric constant, oxidation-reduction potential ... no matter what analytical measurement characterizes your process, chances are Foxboro can make it for you.

Foxboro's wide range of instrumentation covers the entire control loop. Measuring elements, transmitters, recorders, controllers, alarms — all installed as an integrated system. And all under the single responsibility of The Foxboro Company.

What about your process? Are guesswork, or slow, hand-sampling techniques hampering your operating efficiency? Why not put Foxboro to work analyzing your process stream continuously — automatically? Ask your

nearby Foxboro Field Engineer for details. Or write Foxboro's Analytical Department for complete information. The Foxboro Company, 327 Norfolk St., Foxboro, Massachusetts.

Some of the analytical measurements
Foxboro can make-pH • Oxidation-reduction
potential • Dielectric constant • Amperometry • Conductivity • Viscosity • Boiling point rise.





Single-Place Gyrocopter by Bensen Aircraft Corp.

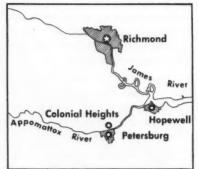
Looking for production savings?

Look into Virginia's Capital Area

Every dollar saved on transportation brings down production costs. And you'll find many such savings in the Richmond-Petersburg-Hopewell-Colonial Heights area of Virginia. For here you can ship by six major railroads, plus 56 scheduled truck lines. You can enjoy excellent air service for both passengers and cargo. And there's a deep water channel for low-cost ocean freight. Ask VEPCO about other savings in Virginia's Capital Area. Write, wire or phone for site and economic data on its pleasant, conservatively-governed communities.



Clark P. Spellman, Manager—Area Development, Electric Building, Richmond 9, Virginia • Milton 9-1411 Serving the Top-of-the-South with 2,086,000 kilowatts—due to reach 2,720,000 kilowatts by 1963.





Publicitie: Comment Faire Avec les Etrangers*

The headline above implies a key point of most of the new sales promotion material offered abroad by U.S. companies—to tell the sales story in the customer's own idiom.

U.S. companies are putting more money and greater effort into foreign operations, and the translation problems involved in producing ads, technical bulletins and the like for the numerous foreign markets are among the most difficult to solve for U.S.-trained chemical marketers.

This shows up in overseas promotional plans. Because of the newness of many of the programs, and the growing rivalry for overseas sales, companies are reluctant to cite specific budgets. But in virtually every case, they are dissatisfied with their overseas promotion so far, know they'll have to spend more in this area than ever before.

And in many cases, much of the newly enlarged budgets must go toward educating staffs on fundamentals of promotion—the best language in which to address the chemical user, the marketing customs, the types of media available, etc.

Courting Overseas Markets: This comparatively new emphasis on promoting CPI products abroad is, of course, tied to the fast-developing "internationalism" of the U.S. chemical industry.

Overseas promotion has grown significantly only since the mid-'50s—little time indeed for companies to develop sophisticated approaches to the numerous markets they now seek to tap. Only in the last decade has promotion gone further than brief ads in local directories—the exception is the drug industry, which has done much more in this field. Now, chemical processors realize the potential business they've virtually ignored, are going after it aggressively (CW, Nov. 26, '60, p. 110).

Kenneth Cosslett, U. S. Industrial Chemicals' export sales manager (who recently returned from a stint in the company's Swiss office), has been able to detect some improvements in U.S. companies' foreign sales promotion by the changes in the attitudes of personnel he met on business trips. He sees the improvement as a stronger attempt by U.S. firms to reach likely buyers "on their own ground."

Budget Building: Most of these improvements have involved spending more money—for nearly two-thirds of the firms responding to the CW survey, the overseas promotion outlays for next year will be increased, or have been boosted just recently. Among these firms: B. F. Goodrich Chemical Co., Jefferson Chemical, International Minerals & Chemical, Nalco Chemical, Goodyear Tire & Rubber Co.'s Chemical Division.

The list of firms increasing their overseas outlay includes industry giants-e.g., Allied Chemical-as well as much smaller firms-e.g., New York City's Schwartz Chemical Co. (maker of dyes, lacquers and metallizing coatings). Now that they are getting more inquiries from abroad, they are trying to provide better, faster information, with the aim of converting prospects into customers. Schwartz, for example, just released a data sheet in Chinese, its second foreign-language promotion piece in recent months. And Allied figures it produced as much foreign sales promotional material during the first quarter of '61 as it did throughout

Promotion Problems: As might be expected, language presents some of the toughest problems for U.S. companies. Putting the promotional material into the native tongue for international marketing can involve literally scores of translations. Beyond this, U.S. companies are finding that they must often "tailor" their messages to specific market or national groups, avoid antagonizing them by ignoring their customs or religious beliefs.

Organizational Problem: One of the important questions that companies must answer before they venture into full-fledged international promotion is how to manage the job—centrally, in the U.S. home office, or from abroad.

For some firms, it's largely a matter of overseeing and coordinating the work of affiliated firms abroad. DuPont, for one, feels that its

^{*} Publicity-how to do it for foreigners.

affiliates can do a more effective job locally than if all operations were directed and implemented from the company's headquarters in Wilmington, Del. In recent years, the company's European product promotion staff of three men was working out of Wilmington. It has been increased to five and now operates out of overseas offices.

Abbott Laboratories (Chicago) follows another course—it closely supervises its extensive worldwide promotional activities (in over 100 countries) from the U.S. It takes great pains, however, to work out the details with the full understanding and cooperation of its individual foreign plant managers.

But it's clear that no one pattern will solve every firm's problems. Central-control proponents point out the advantages of direct, coordinated control, and U.S. production of ads and technical literature.

On the other hand, many firms favor local creation, production and distribution of sales promotional materials. Their arguments: this side-steps expensive American mailing costs and at the same time avoids trouble arising from foreign customs restrictions against imported literature.

They also cite the lower overseas paper and printing costs and wage rates.

Via Native Tongues: While nearly all the companies contacted in the CW survey favor translating their ad promotion pieces into the language native to their proposed market area, most have learned not to entrust this job to U.S. groups outside their own company. Several firms report that glaring errors have occurred in translations done by outsiders. A few companies won't even permit foreign magazines to translate their material because of clumsy handling in some instances. Instead, these companies have certain customers do the translation for them. Abbott Labs, for example, gets much of its translation done by doctors in the countries to which it sells.

When a company decides to translate its material into foreign languages, it generally first chooses to have it put into the languages of Western Europe—French, German, Italian, Dutch, Flemish, Spanish, Swedish, Norwegian, Portuguese. Many firms are also translating promotion material

into the Oriental languages. And Dillon Agnew Associates—a New York advertising agency specializing in overseas direct mail and the production of foreign-language technical literature—reports some clients seeking to have their work translated into Greek, Persian and other relatively uncommon tongues. Drug firms in particular want many translations, including Arabic, Hindustani, Turkish.

Materials going into Belgium are often done in both French and Flemish, and Finland is another two-language country—requiring materials in Swedish as well as Finnish. And marketers doing business in Switzerland must often translate their materials into three languages—French, German and Italian.

Avoiding Faux Pas: A constant worry to U.S. marketers is that they might accidentally offend foreigners because of unfamiliarity with their religious and cultural backgrounds. A just-completed survey of national attitudes by Dillon Agnew (conducted in Belgium, Holland and Germany) helps clarify this problem. The study indicates that national differences must, indeed, be observed if marketers intend to maximize the impact their promotions create. Generally, overseas promotions should be less "slick" than those in the U.S. Moreover, foreigners tend to distrust giveaways; consequently, samples must be offered tactfully.

The Germans and the Dutch like more detail in advertising and literature, the survey shows. And the French and Italians prefer lively use of color.

But despite the obvious requirements to gear each piece of promotional material for maximum effect by "tailoring" it, the Dillon Agnew survey turned up enough similarities among various national groups to warrant the agency's conclusion that good promotional materials—both in philosophy and implementation—are effective the world over.

Outlook: All signs point to substantial growth in CPI overseas chemical promotion, both in total volume and in quality in the years ahead. In fact, some U.S. marketing men believe that the lessons learned abroad may even prove to be valuable influences on domestic chemical advertising, literature and publicity activities.

Drug Group Fined

Drug marketing men are watching closely for follow-up actions in the wake of federal antitrust fines levied against Northern California Pharmaceutical Assn. and its former president, Donald K. Hedgpeth, a San Francisco druggist. The government had charged the group with conspiring to fix drug prices in violation of antitrust laws.

The fines (result of an indictment filed Dec. 14, '60) are the culmination of what is said to be the first successful criminal antitrust action against a state drug group. It is not, however, the only action against the California druggist association: a separate civil injunction against its use of price scheduling is still pending in California. And similar injunctions against state pharmacy associations are also pending in near-by Arizona, Utah and Idaho.

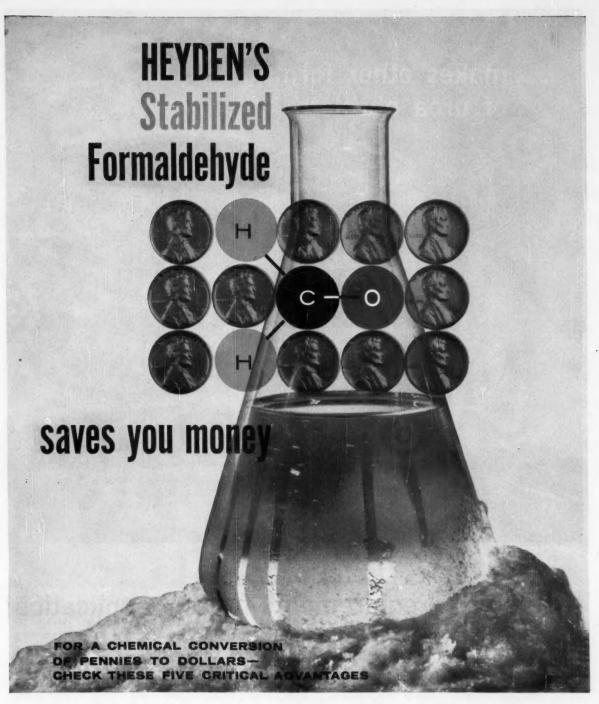
The federal court fined NCPA—which encompasses over 75% of all northern California pharmacies — \$40,000 and Hedgpeth was fined \$1,000 for arranging higher drug prices.

Government counsel Lyle L. Jones had asked for stiffer penalties than those imposed, claims that "some \$3 million/year was extracted from the public as a result of one Hedgpeth schedule increase in '58." He adds that the price schedule was first adopted by California druggists in '57, calling for roughly a 100% increase in prescription drug prices.

Funds for Defense: Jones also stated that the impact of the fines was lessened by "reported large amounts of money being raised" by the association, by other pharmacists, by drug manufacturers and by the American Pharmaceutical Assn. NCPA was reported to be seeking to raise a defense fund of \$150,000 and APA was said to be amassing a \$200,00 pool.

The original indictment alleged that:

- Price competition in the sale of drugs to consumers had been suppressed or eliminated.
- (2) Prices of prescription drugs sold to consumers in northern California had been increased.
- (3) Northern California consumers had been charged arbitrary and noncompetitive prices for drugs.



1. Lower raw material costs possible: A switch from regular 37% Formal-dehyde Solution U.S.P. (6% to 7.5% methanol) to Heyden Stabilized 37% Methanol-Free Formaldehyde saves \$90.00 on every 30,000 pound tank truck order with no changes in your bulk-storage facilities required.

Lower storage costs: Less steam and heating required since Heyden Stabilized Formaldehyde can be stored at much lower temperatures.

3. Lower control and inventory costs: Lower storage temperatures result in a much slower acidity build-up; result in a formaldehyde which maintains its uniformity on prolonged storage.

4. Lower maintenance costs: Slower acidity build-up prolongs life of storage equipment. Greater stability to precipitation of paraformaldehyde results in less sludge removal from tank bottoms.

5. Improved end-products: Since the

uniformity of Stabilized Formaldehyde is maintained on prolonged storage, improved end-products can be expected.

Heyden Stabilized Formaldehyde is competitively priced and available now in production quantities. Information covering complete specification data on Heyden Stabilized Formaldehyde is available. Write for your copy now.

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Maryland Chemical Company, Baltimore, Md. • Taylor Salt & Chemical Company, Inc., Charlotte, N.C.

NEW SOHIO METHOD HOLDS KEY TO SUPERIOR UREA QUALITY

HIGH PURITY LEVEL OF NEW SOLAR UREA MEETS COMPLETE RANGE OF APPLICATIONS

LIMA, OHIO — Superior quality is the major characteristic of a process now being used by Solar Nitrogen Chemicals, Inc., in the production of highpurity Solar Urea. This new manufacturing method is the Vulcan-Inventa process with a Stora-Vulcan evaporator. So dramatic is performance that urea users are developing new yardsticks for judging urea quality — particularly for applications in U-F resins, molding powders, textiles and coatings.

Compact system simplifies synthesis

The simplicity of the Vulcan-Inventa process combined with a Stora-Vulcan evaporator virtually eliminates recycle streams and minimizes contamination and biuret formation. The careful selection of materials results in an absence of heavy metals.



Urea melt is transported at low temperatures to retain high purity and to avoid biuret formation. Both concentration and drying are accomplished simultaneously in the unique Stora-Vulcan evaporator. The use of an inert carrier permits evaporation and stripping at low temperatures — again avoiding biuret formation.

Net result

Performance of Solar Urea proves its value in applications previously requiring crystalline urea. Yet Solar Urea is prilled, retains its free-flowing, easy-to-handle properties even during prolonged storage. Further safeguards in storage and packaging facilities mean that Solar Urea comes to you as pure as it was made.

For a production sample of new Solar Urea, write to Sohio Chemical Company, P.O. Box 628, Lima, Ohio. SALES

Charting Sales Shifts

Trends in industrial sales and marketing organizations—long observed by CPI management—have been charted in the latest survey of American industry by the National Industrial Conference Board. The study discloses no hitherto unknown details, but it does emphasize the contrast between marketing and traditional sales administration and also reveals more of the reasons behind staff reorganizations and line sales changes.

Three out of four of the 168 firms surveyed report changes in their sales organizations in several areas.

Staff and Line Changes: Expansion and product diversification have been major factors in the growth of the "marketing concept." At the staff level, purpose of reorganizations has been to reduce the number of men reporting to the chief sales executive—giving more responsibility for line sales control to the general sales manager. At the same time, top sales management is giving more attention to market research and over-all marketing problems.

Line sales management, in a move to "integrated marketing," is being coordinated with such related functions as product planning and testing, advertising, marketing research, statistical analysis of sales, forecasting and measurement of market potential. Another line change is the shift to market-oriented selling (CW, May 6, p. 65). More chemical salesmen are using a customer industry-specialized approach, instead of the traditional product-oriented technique.

Major Problems: Pricing policies and price cutting by competitors are sales executives' biggest headaches, report some 28% of the companies in the NICB survey. These problems seem to result mostly from industry overcapacity, declining markets, economic recessions and competition from products that can be easily manufactured by small, low-overhead firms with a minimum of capital expenditure.

The best answers to price competition: hard selling, quality, service and cost savings. Among the techniques reported to NICB: emphasis on "value analysis approach"; fewer large-volume but low-profit sales; weeding out small, expensive accounts and mar-

ginal products; increasing frequency of customer contacts; and improved sales training.

Renewed emphasis on sales training is centered principally on teaching new techniques—including refresher courses in the field and at sales head-quarters. The main problem to overcome here, many companies feel, is lack of aggressiveness and sales determination. Among the steps proposed to improve salesmen's morale: improved communications with the home office; stepped-up advertising to meet salesmen's needs; introduction of new products in a wider range; and use of more sales promotion programs.

Effective? As a result of these changes, most companies report that they feel better prepared for more hard sell. However, many such changes have been too recent to demonstrate results. And sales executives are never certain that an improved sales volume is actually the direct result of any organizational change. But with constant checks on industry trends, including efforts such as the NICB survey, sales management can spot any potentially better selling techniques and management shifts and gauge their applicability for the CPI.

Packaging Progress

The U.S. packaging industry—particularly those segments serving the chemical process industries and consuming their products—is prospering. That's the gist of the latest issue of Containers and Packaging, the Commerce Dept.'s quarterly packaging report to industry.

Over-all, total U.S. container volume in '60 was 2% below '59's all-time peak. But the Commerce Dept. reports that container makers look for business this year to equal or surpass '60's.

Big Gains: The major advances were registered in two CPI market areas: flexible packaging and rigid aluminum foil containers.

Flexible - packaging shipments gained 3% over '59 levels, with unsupported polyethylene bags and pouches leading the way with a 4% rise. Total shipments of all transparent films for packaging uses in '60 were estimated at 443 million lbs., up from 423 million lbs. in '59 and 327 million in '55.

Rigid aluminum foil containers hit



Refinery customers have found that, in comparison with other inhibitors, Dalpac 4 (Hercules 2,6-di-tert-butylp-cresol) saves up to three dollars on every thousand barrels of gasoline produced. Dalpac 4 inhibits gum formation, stabilizes gasoline color, and helps maintain engine cleanliness. Refiners have also found it to be excellent in turbine and transformer oils where it prevents deterioration, and does not affect electrical properties.

For additional information write:

Oxychemicals Division HERCULES POWDER COMPANY Hercules Tower, 910 Market Street Wilmington 99, Delaware



new highs last year, topping '59 marks by 8% in value of shipments (\$32.5 million) and 9% in pounds of metal consumed (nearly 50 million).

But packaging closures, metal cans and steel drums and pails showed declines in volume. Barrel and drum shipments, were hard hit, dropping to their lowest level since the mid-'40s and some 9% below '59's pace.

But the chemical industry's drum usage declined less sharply than many -from some 16 million units in '59 to 15.4 million last year-buoyed by the steadily increasing proportion of steel drums and barrels going into chemical usage. For the first time last year, over half of all domestic steel drums went into chemical uses, up from 47.8% in '59 and only 36% in '55. Still more were used for paints, inks and other specialty chemicals.

Safety Controversy

Another move to regulate chemical trucking-and possibly raise shipping costs-has become a center of controversy in recent weeks. Crux of the controversy: the National Board of Fire Underwriters' (representing private insurance firms) proposals for "uniform standards for highway transportation safety" in handling, routing and labeling of extra-hazardous materials.

Major objections are coming from several industry associations - e.g., Chlorine Assn., Manufacturing Chemists Assn.-which feel that the industries and truckers affected should have a voice in developing any recommendations. Also, they regard the term "extra-hazardous" as too easy to misinterpret. Right now NBFU is studying possible ways to gain wide acceptance of its proposalshopefully by some central agency in each state-and to set the specifications for the extra-hazardous category.

Although the official list of specific recommendations is not expected until later this month, advance copies (about 25 pages each) are now being studied by industry representatives. Among the other groups seeking a voice in the proposals: American Petroleum Institute, Compressed Gas Assn., LP Gas Assn., and National Tank Truck Carriers.

Basic Plan: In a preliminary report, NBFU has outlined the basic needs of a uniform program to minimize cargo-hauling dangers:

· Designated routing of trucks to avoid heavily populated communities and congested highways.

 Extension of truck placarding requirements to all types and quantities of extra-hazardous materials.

 Police escort when travel through tunnels, heavy traffic or crowded communities is unavoidable.

· Standard display practice for waybills, shipping papers and firefighting information.

· Fire safety training programs for drivers hauling dangerous commodities.

When its official code is issued (in a few weeks), NBFU says, it will study any suggestions offered by industries and truckers affected. Meanwhile, opponents of the proposals consider many of them "above and beyond" Interstate Commerce Commission regulations; they consider some "unnecessary and unworkable." For example, NTTC points out that truckers would welcome uniform regulations from state to state, but the association feels that "reasonable" minimum limits should be set on quantities of materials subject to routing and labeling control.

And, although NBFU uses the extra-hazardous category generally to cover rocket fuels, fissionable and radioactive materials, highly toxic products and poisonous gases, explosives and potentially explosive chemicals, other industry groups contend that they should help determine which commodities are covered. In turn, NBFU points out that a clause in its recommendations leaves application of this category for local state authorities to decide, including exemptions determined by product type and

Ohio Bill: The difficulty of getting uniform state-to-state regulations was highlighted by a recent move in the Ohio Senate. A bill has been introduced to prohibit the hauling of gasoline or other petroleum liquids in double-trailer trucks, with fines of up to \$200 and/or six months in jail for violations. Behind the proposal: a local accident in Toledo involving a double-trailer truck carrying 7,900 gal. of gasoline. Chances are, feeling in other states would have to be aroused by an accident closer to home before such a proposal could win nationwide application.



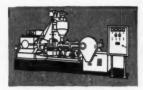
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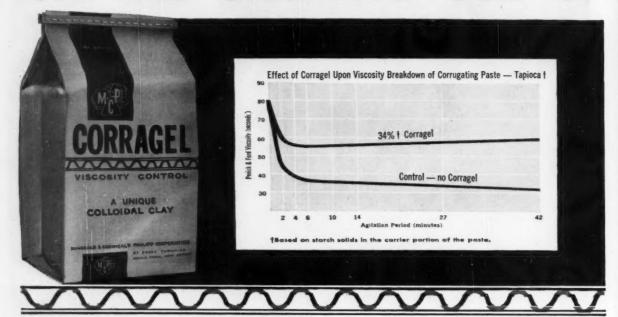
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July 8, 1961 CHEMICAL WEEK 39



ON THE CREATIVE USE OF



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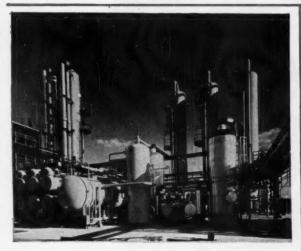
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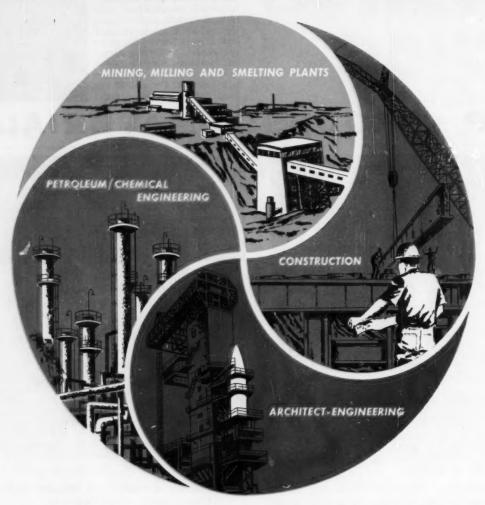
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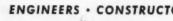
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Washington

Newsletter

CHEMICAL WEEK July 8, 1961 A stepped-up program of federal grants for sewage plants has been agreed upon by House-Senate conferees. Here is the way it will work: the present \$50-million/year authorization will be increased to \$80 million in fiscal '62, \$90 million in fiscal '63, and \$100 million annually for the subsequent four years. The maximum grant for a single project will be raised from \$250,000 to \$600,000, but cannot exceed 30% of the total cost.

The House had voted to double the program to \$100 million/-year immediately, while the Senate had approved a graduated increase somewhat smaller than the final compromise version. Both Houses will give final approval to the measure after the July 4 recess and send the bill to the White House for the President's signature.

Chemical firms that ship by barge are resisting proposals in Congress to impose tolls on waterways. Along with barge operators and other shippers, they mapped their strategy at a recent meeting of the National Waterways Conference. Paul G. Blazer of Ashland Oil & Refining, board chairman of National Waterways, says a toll of 2 mills/ton-mile would double the cost of inland water transportation.

Bills to impose such user charges have been introduced by Sen. J. Glenn Beall (R., Md.) and Rep. James E. Van Zandt (R., Pa.). Hearings may be held this year, but no action by either the House or Senate is expected before next year. President Kennedy has hinted that he may support such a plan.

The legality of sharply reduced freight rates offered by Eastern and Western railroads under so-called Piggyback Plan No. Three has been upheld by the Interstate Commerce Commission. This is of particular significance to the chemical industry, so much so that the Manufacturing Chemists' Assn. went all out to urge approval of the lower rates during ICC proceedings.

Under the plan, railroads haul on their flatcars the truck trailers or containers owned by the shipper, who fills them himself and delivers them to the rail loading ramp. They are moved at a flat per-trailer fee without regard to the classification of the freight inside. Rates are considerably below those on freight moved via boxcar and generally are below common carrier truck rates.

Four major salt companies have been indicted by a federal grand jury on charges of fixing prices on rock salt. The indictment charges the firms, which mine and distribute 75% of the nation's rock salt, with a conspiracy to submit identical bids on rock salt contracts to state and municipal governments across the country. The indictment was returned in federal court at St. Paul, Minn.

Washington

Newsletter

(Continued)

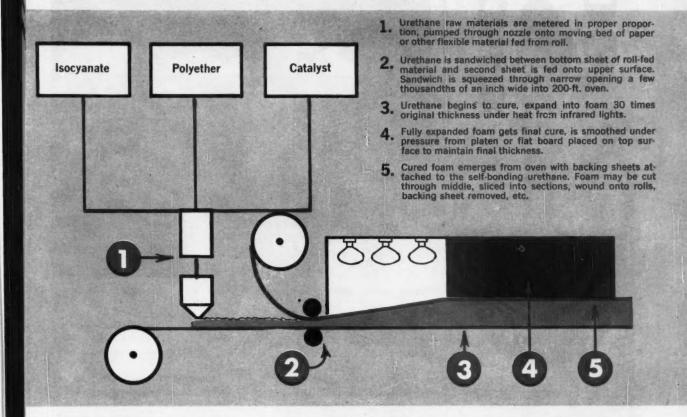
Named were Morton Salt Co. (Chicago), International Salt Co. (Clarks Summit, Pa.), Diamond Crystal Salt Co. (St. Clair, Mich.), and Carey Salt Co. (Hutchinson, Kan.). The Justice Dept. charged that the firms conspired for "many years" to fix salt prices, to adhere to a zone pricing formula, to allow the fixing of a delivered price to any point in the country, and to exchange price information among themselves.

Procter & Gamble's acquisition of Clorox Chemical Co. did not necessarily violate the Clayton Antitrust Act, says the Federal Trade Commission. An FTC examiner had ruled that the acquisition, in Aug. '57, did violate the act. He issued a preliminary order that would have forced P&G to divest itself of Clorox. FTC rules, however, that it had insufficient evidence about the effect of the merger on competition to take such action. It returned the case to the examiner, told him to obtain more evidence on the competitive situation in the liquid bleach industry. P&G is confident that additional evidence will reinforce its position.

Additional and larger saline-water conversion plants will be built if Congress approves the accelerated research and development program submitted by President Kennedy. In addition to new and larger plants, the Kennedy proposal would extend the duration of the present program from 7 to 15 years. Demonstration plants currently under construction should produce fresh water at about \$1 to \$1.25/1,000 gal. Cheaper conversion methods will be sought under the expanded program.

A vigorous condemnation of the drug industry by the Democratic majority of the Senate Antitrust and Monopoly Subcommittee has elicited an equally vigorous defense from the Republican minority. The Democrats, in a 500-page report, pictured the major drug manufacturers as reaping unusually large profits from control of patents and at the expense of patients. Republicans described the majority report as prejudiced and unfair—a "500-page monstrosity." The argument is bound to continue when Sen. Estes Kefauver (D., Tenn.) resumes drug hearings this week. He is scheduled to hear testimony from American Medical Assn. officials in the opening phase of hearings on his bill to impose strict controls on the drug industry. Further hearings will be held July 18-21.

A 14-member technical subcommittee to the petrochemical committee of the National Petroleum Council has been named. The subcommittee will be headed by Thomas L. Cubbage, vice-president of the Phillips Chemical Co. (Bartlesville, Okla.). It will survey the petrochemical industry to determine such things as production capacity, rawmaterials requirements, electric-power needs, manpower requirements and plant locations. The parent committee on petrochemicals is headed by a New Orleans business consultant, Bruce K. Brown.



Rolling Out Lower-Cost Urethane Foams

Howard Effron, president of The Technifoam Corp. (New York), and Jean Lamoureux, sales manager, are out to convince urethane processors of the advantages of a new foammuking method (diagram, above)—for which they claim an impressive 48% reduction in processing costs.

The pair returned this week from launching of the European phase of a worldwide sales effort.

The Technifoam processing machine automates and closely controls the proportioning and mixing of urethane raw materials. It spreads, foams and cures the urethane between two continuous layers of material—e.g., paper, foil, plastic, wood or metal—as it is fed into the machine in sheets or from rolls.

The method eliminates trimming, slitting and laminating of foam produced with conventional slab-molding machines, and mechanizes the poured-in-place technique used for sandwich-panel production for the building con-

struction industry, Technifoam says.

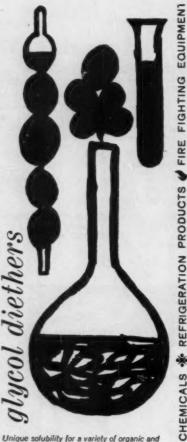
The basic process is covered by a Collins & Aikman (New York) patent (U. S. 2,841,205). C&A retained the rights to use the process with cloth in the U. S. But Foam-Flex Corp., now a Technifoam subsidiary, has worldwide rights for all other materials and for cloth outside the U.S. (CW Technology Newsletter, Dec. 24, '60). Six additional U.S. and foreign patent applications covering equipment design and process techniques have been filed by Technifoam.

Technifoam leases the machine, licenses producers on a controlled basis determined by location, materials processed and end-use of the product. Servicing is provided by Technifoam's VOMA subsidiary.

A plant will be set up by Technifoam in Carteret, N. J., to develop new enduse products. A myriad of flexibleand rigid-foam items are envisioned, but right now the company is concentrating on the equipment and the basic process rather than on the enduses.

Cutting Costs: In some respects the basic process appears to differ little from the conventional slabbing machine technique. Although Walter Voelker, Technifoam's vice-president of engineering, claims refinements have been made, the new machine proportions and mixes the raw materials in a conventional manner, and dispenses them from a traversing head over a sheet of flexible material. Ordinary slabbing machines, however, produce a thick block of flexible or rigid foam, usually 18-30 in. thick at a rate of 6-18 ft./minute. This slab must be trimmed and cut to shape.

The new machine, called The Technifoam Processor, produces a thin, $\frac{1}{16}$ - to 3-in. continuous sheet at a rate of over 100 ft./minute (although sheets more than 8 in. thick could be turned out with minor modifications in the basic machine). This



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Technifoam's Effron (left) and Gordon talk process fine points.

sheet requires little or no trimming. And it is made to finished thickness, so that cutting costs are eliminated. By making a product of finished-sheet thickness, Technifoam takes advantage of the self-bonding characteristics of urethane foam, described by Voelker as superior to that of most adhesives. Backing materials are bonded to the urethane in the machine without use of an adhesive (which upon aging might become brittle and crack when flexible foam is bent).

To obtain unbonded foam, special silicone-treated release paper that can be peeled off is used as a backing sheet in the machine.

Quick Change: The machine can be switched from flexible-foam to rigid-foam production in a few minutes. Aside from a way to switch chemicals, Voelker has developed a technique for feeding rigid backing sheets onto both sides of foam while it is still being cured. This will permit production of sandwich panels used in building construction. They are normally made by pouring the urethane raw materials into upright molds. Although there may be some densification of the foam in the rigid panels produced by Technifoam processing. the foam will probably have more uniform characteristics than that produced by in-place pouring.

So far, the machine has not been tried with one-shot foam-producing

systems (CW Technology Newsletter, Nov. 22, '58). but indications are that there will be no production difficulties.

Processing Know-How: One of Technifoam's strong points is the processing know-how it will provide equipment licensees. Voelker has been in urethane equipment and plant design work since '56, joined Joseph Gordon (now Technifoam treasurer) in early '59 to form Foam-Flex after Gordon had obtained patent rights from Collins & Aikman. Gordon and Voelker developed a pilot model of the present machine late in '59. For over a year they have been working on the commercial machine, testing formulations (e.g., urethane ingredients-isocyanate, polyether, catalyst, fluorocarbon for foam blowing, and coloring agents-can be mixed in various proportions).

Formulations, curing rates, cell structures, etc., to give the best strength, adhesion and other physical characteristics have been developed for many foam products. And, because urethane foam production requires strong processing background in both chemistry and equipment, the commercial success of Technifoam's new processing method will depend on the know-how it has developed.

If potential cost savings prove out in production, urethane foam seems assured of gaining new markets.



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PRODUCTION



Filter press plate (left) awaits final inspection after coating.

New Coat Cuts Filter Cost

The filter-press plate and frames shown above—on their way from the coating tank at the Chicago plant of The Polymer Corp.'s Whirlclad Division (Reading, Pa.)—are the first units to have been coated with Penton by the fluidized-bed technique. Advantages: longer service life in corrosive conditions and 20-60% lower initial cost.

The coating technique, according to Polymer, permits a thin, 0.020-in. coating application that is pinhole-free, despite the many sharp corners and grooves in the press plate. No finishing operation is required, whereas sheet-applied and dip coatings are often as much as $\frac{1}{16}$ in. out of parallel after coating. The grinding operation that is required to bring the packing surface of the plates and frames to within the usual 0.005-in. tolerance may add 40-60% to the cost of the coating.

Polymer is able to apply its 0.020-in. coating with tolerances of ± 0.001 in. In the process, the metal filter press plate is heated to about 550 F (i.e., a temperature above the melting point of the plastic coating, which fuses at 350 F). The plate is then immersed and agitated in a tank of the finely divided Penton resin, which is held in air suspension. The resin particles fuse and adhere to the metal surface.

Polymer is offering the coating

service on a custom basis for plates and frames up to 42x42 in. The first plates and frames were coated for D. R. Sperry & Co. (Batavia, Ill.).

The Whirlclad process can also be used for the coating of nylon, cellulosics, vinyls, epoxies and polyethylene. Penton, Hercules' chlorinated polyether, was picked for the filterpress application because of its ability to withstand corrosive conditions at temperatures up to 250 F. The other plastics would have high-temperature limitations of 140-175 F when completely immersed in liquid.

The Penton-coated plates, applied over cast iron, are 20-60% less expensive than stainless-steel plates or plates that have been coated with a hand-applied rubber. And in one of their first applications, the plates and frames are expected to have longer service life over solid-rubber ones.

By using solid-rubber plates and frames for filtering corrosive liquid at high temperature, one chemical plant has obtained one-year's service life. Although cast-iron plates coated with Penton cost 20% more, they are expected to give better corrosion resistance at a higher filtration temperature. And they are expected to pay out in two years.

Although actual operating life cannot be determined yet, indications are that the coated plate and frames will have a 10-year life.



helps
ball maker
bounce back into
competition

Intensified competition in selling sponge rubber balls inspired a thorough cost study

by Barr Rubber Products Company. To help make it, they called in a Goodrich-Gulf sales engineer. A switch from natural rubber to an Ameripol synthetic rubber polymer really produced results. Barr was able to cut its raw material costs substantially. Quality of the end product is maintained at the same high level, and processibility improved. If you make

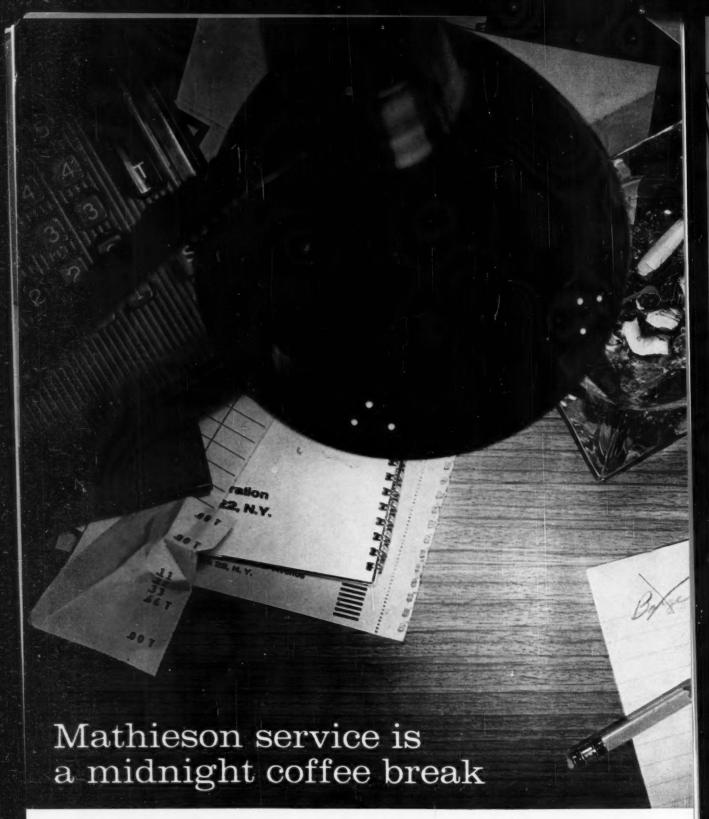
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EQUIPMENT

Removable Blade Agitator: Glascote Products Inc., a subsidiary of A. O. Smith Corp. (20900 St. Clair Ave., Cleveland 17), is offering a new removable blade, glass-coated agitator. It fits through 12x16-in. manholes, eliminates the need for undesirable large openings in high-pressure vessels and multinozzled reactors. By controlling compression, the strain on the gaskets imposed by the downward thrust of the agitator is eliminated. Special resilient gaskets keep a tight seal and prevent corrosion at the joint where the blades are connected.

New Grating: A new grating, said to have 60% greater load-bearing capacity than gratings now marketed, is offered by Blaw-Knox Co. (300 Sixth Ave., Pittsburgh 22). The grating's closer mesh (36 and 37 bars per 2-ft. width, with ½- and ¾-in. openings between the bars) adds to the strength but retains a high degree of visibility and ventilation. It is available in sections 20 ft. and longer, with galvanized, painted and B-K's Ponbake Epon finishes.

Portable Vibrator: Cleveland Vibrator Co. (2828 Clinton Ave., Cleveland 13) is offering a new portable vibrator that can be attached to concrete forms, bins and other objects. The device can be secured to any structural member up to 4 in. thick with a sliding-rod vise clamp. The vibrator weighs less than 70 lbs., develops more than 1,000-lbs. force, has a frequency of over 1,700 vibrations/minute with 60-psi. (air). It can be operated with as little as 30-psi. (air).

Air-Attrition Mill: The Bauer Bros. Co. (1727 Sheridan Ave., Springfield, O.) has developed a new air-attrition mill called the Hurricane Pulverizer-Classifier for reducing and classifying dry chemicals to a uniform particle size of less than 1 micron. The unit has already been used to classify 1,-500 lbs./hour of ethyl cellulose.

Check Valve: A new, miniature check valve to handle pressures up to 20,000 psi. is now available from Marotta Valve Corp. (Boonton, N.J.). The Model CV17 can be used with corrosive liquids or hot gases up to



CROSSLINKING:

Shell announces ALDOCRYL* Resin X-12, a new acrolein derivative for crosslinking and other condensation reactions

ALDOCRYL Resin X-12 is a highly reactive material of low molecular weight. In chemical reactivity it resembles aldehydes.

The product is completely water soluble, essentially colorless, storage stable, and furnished as a 50 per cent aqueous solution.

Animal screening tests indicated ALDOCRYL Resin X-12 is only mildly toxic by oral ingestion and skin absorption. Prolonged exposure to the skin resulted in mild irritation.

Suggested applications

ALDOCRYL Resin X-12 has a number of promising applications in the modification of cotton, rayon, starch, proteins and plastics and resins.

Among the more important are:

Textiles: The usefulness of Aldocryl. Resin X-12 is indicated in the stabilization of rayon and the crease-proofing of cotton.

Since ALDOCRYL Resin X-12 is a non-nitrogenous material, cellulosic fabrics treated with it are resistant to chlorine damage.

Protein modification: There are indications that ALDOCRYL Resin X-12 is of potential interest to the tanning industry. Preliminary data suggest the product may be useful in producing

white leathers with good hydrothermal and hydrolytic properties.

It is also reported that protein-based adhesives can be insolubilized with ALDOCRYL Resin X-12.

Starch: Under selected pH conditions, Aldocryl Resin X-12 will react with starch to yield water insensitive films.

Plastics and Resins: ALDOCRYL Resin X-12 will react with phenol—an indication of potential usefulness in modifying plastics and resins.

Availability

ALDOCRYL Resin X-12 is a development chemical. Shell will be pleased to send you additional information and laboratory samples. Please address your letterhead requests to:

Shell Chemical Company, Product Development Department, Industrial Chemicals Division, 110 West 51st Street, New York 20, New York.

*Shell Trademark

A Bulletin from

Shell Chemical Company



Industrial Chemicals Division

PRODUCTION

1800 F. Its capacity is equivalent to a sharp-edged orifice of 0.125-in. diameter. It has connections for ¼-in. tubing or hose, fittings for ultrahigh pressures, fast-acting metal or plastic poppets. Dimensions: over-all length, 2½ in., diameter, 1 in.; weight, 0.125 lb.

Microfilter: Fluid Dynamics Inc. (Dept. P-1, 90 West St., New York 6) says its new "T"-type, high-pressure, cartridge microfilter has 25% more capacity and less pressure drop than standard designs. Units operate at pressures up to 10,000 psi., remove particles ranging from 2 to 100 microns. While standard filters are designed with outlet ports on the center line, the new filter outlet is nearer the edge and larger, which results in lower pressure drop, greater flows, according to FDI.

Spring Filter: The Crome-O-Lite Co. (2701 East 78th St., Minneapolis) has just developed a new compression spring filter for handling high fluid volumes in pressurized pipelines, suction tubes and immersion pumps. Two interwound springs insure precision spacing of 20-, 40-, 60- and 100-mesh filter elements and provide spring-apart action, which exposes all surfaces for in-line cleaning. The filter can strain water of thin or high viscosities, at line pressures to 1,000 psi.

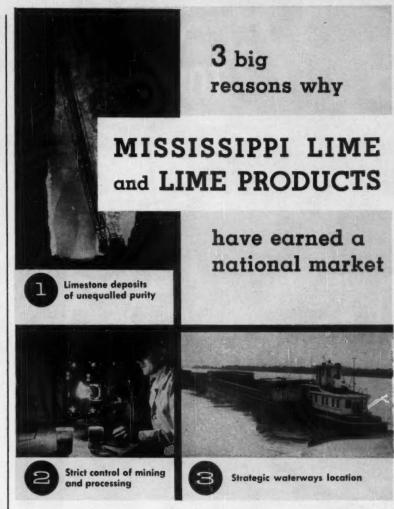
Drum Mixer: National Industries (330 West Franklin, P.O. Box 392, Jackson, Mich.) is out with a new mixer for rapid blending of chemicals in 55-gal. drums. The NiMixer, Model 2155, uses a rotary oscillating motion that cuts a paint pigment blending job from five hours to 20-30 minutes, according to NI. Because material is mixed in the original container, contamination and loss of chemicals are avoided. One man can roll the drum onto the mixer bed where built-in hydraulic jacks raise and center the drum in a cradle. Cradle rotates without vibration at 30 rpm., is driven by 1-hp., 220-440-volt, three-phase, 60-cycle motor.

Pipe Coating System: A new combination asphalt coating and primer that reduces maintenance and power costs for underground pipes with cathodic protection has been developed by Monsanto Chemical Co.'s Lion Oil Co. Division (El Dorado, Ark.). The coating and primer reportedly handle easier and faster than similar coatings. In cathodic bonding tests (270 days at 1.5 volts), the Lion combination of asphalt coating and primer received a 55% higher performance rating than did other commercial coatings. The asphalt coating is designated Lion 5-A-60; the primer, Lion E-120-A.

Top-Entry Ball Valve: A new Evertyte line of top-entry ball valves have larger flow passages and are easier to inspect and service than other lines, according to Strong (508 Sandusky St., Conneaut, O.). Orifice areas are claimed to be as much as 17, 35 and 40% larger than other 1-, 34- and 1/2-in. ball valves, respectively. As a result, liquids and gases flow through the valve with less noise and pressure drop, Strong says. The valve has a one-piece body and a cover made of cadmium-plated stainlesssteel bar stock. It has a rating of 150 psi. at 365 F for steam and 1,000 psi. for liquids.

Pressure Gauge: A new pressure gauge, Series 6925, designed to eliminate recalibration problems, is now offered by American-Standard Controls Division (5900 Trumbull Ave., Detroit 8). Key improvements: (1) no moving parts such as links, pivots or gears-eliminating the usual points of wear; (2) direct connection between the pointer and the pressuresensing element, a helical-wound Inconel X bourdon tube; reported high accuracy-in tests which lasted over 100,000 cycles, the over-all accuracy of ±1/4 % full-scale actually increased. The gauge can be used for pneumatic or hydraulic service up to 10,000 psi., is available in 4 -in. and 6-in. dial sizes.

Fow-Rate Controller: The Brooks Instrument Co. (Hatfield, Pa.) is now offering a new line of flow-rate controllers for purge, flow control and indication applications. The line, Series 8800, reportedly gives better flow-rate regulation. The unit is self-contained with an internal diaphragm assembly that can be set for constant pressure differential, and a rotameter mounted on a needle-valve-operated flow controller.



If you have need for lime for <u>any</u> purpose, keep these facts in mind:

Mississippi Lime Company's entire limestone deposits have a natural purity and uniformity unequalled in such quantity anywhere. The entire formation tests 99% pure calcium carbonate.

Strict control of mining and processing guards this nature-endowed purity. As a result, "Mississippi" is specified wherever there is demand for the highest quality lime and lime products.

To these advantages, add our strategic location in the heart of America. Immediate shipment of your order, large or small, can be made by barge, by rail or by truck. This often saves you time and money.

Our technicians are always available for consultation. See our specifications in Chemical Materials Catalog.



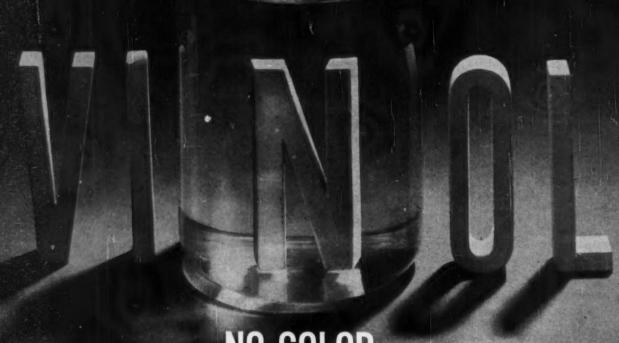
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Vinyl Monomers Acetylenic Chemicals



Calcium Carbide Pipeline Acetylene



Vinyl Resins Copolymers

Technology

Newsletter

CHEMICAL WEEK
July 8, 1961

"Ring dyeing" appears to be the key to dyeability of Dow's Zefran acrylic fiber. Dow has not given clues beyond saying that the structure is essentially a continuous polyacrylonitrile (hydrophobic) background containing discrete areas of a hydrophilic dye-receptive polymer (CW Technology Newsletter, March 23, '57). But fiber makers report that Dow is first making the polyacrylonitrile, then passing it through a bath of polyvinylpyrollidone. This concentrates the PVP on the outside of the fiber rather than distributing it evenly throughout. Using dyes with particular affinity for PVP, the effect is ring, or surface, dyeing rather than complete penetration.

Radioactive reactors can be inspected without dismantling by use of a ribbon-shaped probe developed by Optics Technology, Inc. (Belmont, Calif.). The probe is based on photographic inspection techniques, reportedly can "see" cracks, corrosion and other faults in inaccessible parts of submarine reactors. The technique may also find use in the chemical industry. A probe is now being built by the company for Westinghouse (under a \$60,000 contract).

The unit consists of a ribbon-shaped probe 9 ft. long, 3 in. wide, and less than 2 millimeters thick. One end of the probe moves along the surface to be inspected; the other end moves simultaneously along a strip of photographic film.

In the probe are five aligned layers of optical fibers, each 1,500 strands wide (equivalent to 3 in.). Three layers are used to transmit light from an outside source into the interior. The other two layers pick up the reflection from the inspected surface and transmit it back to the film. The result is a picture of the surface as it would appear to the eye.

Electron-irradiated polyethylene may be subject to licensing under a recent patent (U.S. 2,981,668) granted to Electronized Chemicals Corp. (Brooklyn), a subsidiary of High Voltage Engineering Corp. ECC has notified firms in the field (e.g., General Electric, W. R. Grace, Raychem Corp.) of this possibility, is now awaiting their reaction.

Graphite fiber will be made in Japan by a team of four major manufacturing firms: Matsushita Electric, Japan Carbon, Toyo Spinning and Japan Exlan. Research and development is being carried out at Japan Carbon's Osaka laboratories and a pilot plant is being built at Yokohama. The material is said to resist temperatures up to 2000 C, with potential applications in jet-engine packing, linings of jet and missile exhaust nozzles, and missile nose cones. (National Carbon Co., a division of Union Carbide Corp., makes graphite cloth in the U.S.).

Start of a trend in urea technology? It could be, since Nihon Gas Kagaku Kogyo KK (Nigata, Japan) discloses it will switch its existing-

Technology

Newsletter

(Continued)

recycle urea plant to a new type, total carbamate recycle. Capacity will be hiked from 90 metric tons/day to 150 tons/day by use of the new process, ultimately to 290.

It's the first urea plant to make such a changeover. And Chemical Construction Corp., which designed Nihon's original plant and has a contract for the redesign project, says many of its other clients with partial-recycle plants are inquiring about switchover costs. Presumably, other firms who offer a total-recycle process (CW, Nov. 12, '60, p. 69) are receiving similar requests.

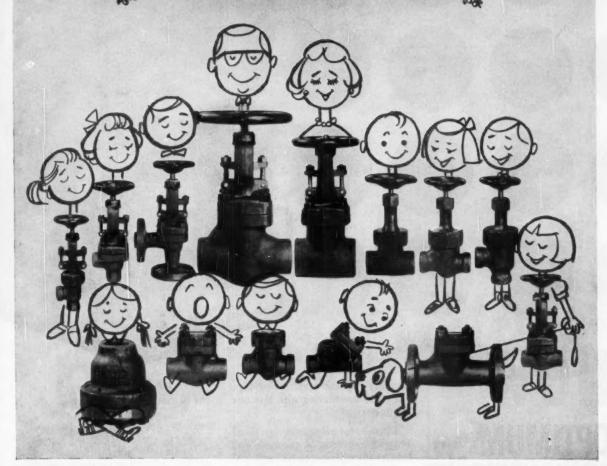
Chemico says studies show that by adding 25% to original investment, depending on capability of existing equipment, urea producers can increase capacity 50% by converting to total recycle. In addition, the redesign is said to cut power requirements by 25%, steam by 50% and cooling water by 50% for each ton of urea produced.

Another \$13,375,000 for materials research programs has been awarded to five universities by the Advanced Research Projects Agency of the Defense Dept. Last year ARPA started a program of supporting these interdisciplinary efforts—including physics, chemistry and engineering of materials in general—by granting \$13.9 million over four years to Cornell, Northwestern and University of Pennsylvania. The new four-year contracts were awarded to Harvard, Massachusetts Institute of Technology, Brown, Stanford and University of Chicago. Work will be done in the fields of metallurgy, solid-state physics and chemistry, and geophysics, although emphasis will be on combining these approaches wherever possible. MIT, for instance, set up an interdisciplinary materials research center last year.

Glass fixation of waste nuclear fission products will be carried out in a new pilot process at Britain's Harwell research establishment. The process, a semibatch system developed by Harwell engineers, uses an expendable steel cylinder. Fission product waste is mixed with slurried borax and silica, fed to the reactor and heated to temperatures graduated from 1500 F to 1800 F. The slurry is evaporated and residual oxides fused to glass. This is cooled and transferred to storage in the reactor. Vapors produced in the reactor are passed through an identical cylinder for filtration; and the filtration vessel becomes the reactor for the next batch.

Britain has halted research on making oil from coal but will continue development work on coal gasification projects. Following the recommendations of the government-sponsored Wilton Committee—set up to investigate the possibilities of deriving other fuels from coal—the British government will concentrate research on high-pressure slagging gasifiers, the standard Lurgi gasifier, and the Otto-Rummel gasifier. The committee reported that prospects for making oil from coal economically are now so remote that no further development work should be undertaken.

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PUMPS

Simplify process engineering . . . cut parts inventories with this one basic design!

Pinched for process design time? Bugged by corrosive, pressure and temperature problems with pumps?

Solve all these, and other modern pumping problems with this new concept in pump design. It's a back pull-out, horizontal, single-stage, end suction centrifugal. The Model 3195 makes process engineering easier . . . keeps pumping cost low because it gives you:

Maximum interchangeability. The Model 3195 gives you the greatest range of coverage and flexibility—with minimum parts needed—of any line on the market.

For example, you can mount any

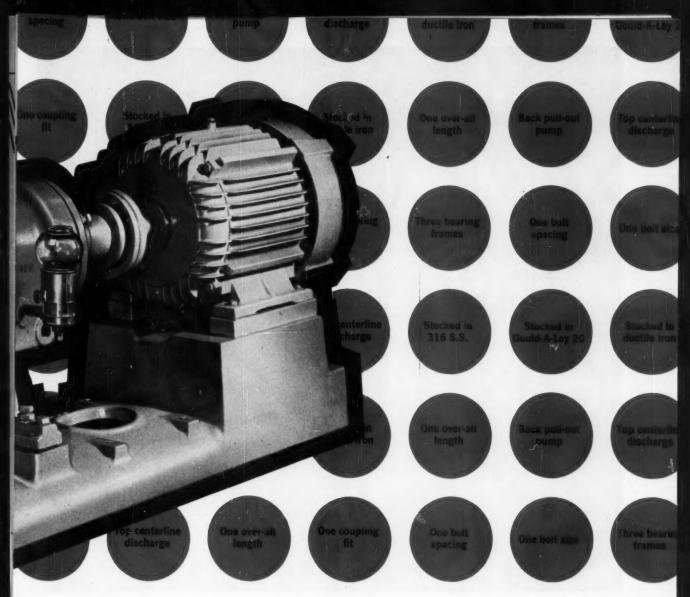
one of the 11 pump ends to any one of three bearing frames (shafts 1¼, 1¾, and 2½ through stuffing box). Service conditions will determine your choice of bearing frame.

Nominal impeller diameters of 6", 8", and 11" cover the range of the Model 3195 line.

The diagram at right shows you dimensional interchangeability of the units themselves.

Easier maintenance. Back pull-out design, one of a number of easier maintenance features, lets your men replace parts without disturbing piping connections or motor mounting.

Mechanical reliability. Shaft deflection less than .002" at stuffing box face. Two-year minimum bear-



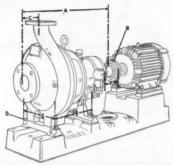
ing life. Dowelled construction provides exact parts alignment.

Full-range coverage.

Capacities 5 to 775 GPM Head 10 to 300 ft. TDH Temperature . . - 350° to +500° F Working Pressure

0 PSIA to 275 PSIG

Cost-conscious materials. You can get any pump in the line off the shelf in any of these standard constructions: ductile iron, 316 stainless steel, Gould-A-Loy 20. It is also available in any machinable alloy.



Dimensional Interchangeability Between All Model 3195 Pumps

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Please send me bulletin on Goulds Model 3195 Chemical Process Pump, showing interchangeability, dimensions and curves.

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Company.....

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City.....Zone.....

County.....State....



Vapor and Acid (No. 6111)

Liquid Oxygen and Nitrogen (No. 6220)

New Suits For Full Body Protection

Here are two new protective suits designed to guard against hazards of vapor and acids or liquid oxygen and nitrogen splash. Each is made of special nylon fabrics, with hoods cut to fit over safety caps and windows that give the wearer ample viewing area.

The yellow vapor-and-acid-proof model is one-piece construction, polyvinyl chloride coated nylon, with all stitched seams sealed inside and outside. Requires self-contained breathing apparatus. Special sleeve cuffs are designed to give a good seal with either molded surgical gloves or with supplied, heavy-duty coated fabric gloves.

Suit can be fitted with air hoses for ventilation, is cut large enough for self-breathing apparatus.

The liquid oxygen-nitrogen suit is translucent white or green, specially-treated nylon fabric (patented). It consists of the coverall, hood, boots and fully-lined, dehydrated cowhide leather gloves. Material is static-resistant, flame-resistant and oil-free. This model is currently used by the Armed Forces and industrial ground service crews.

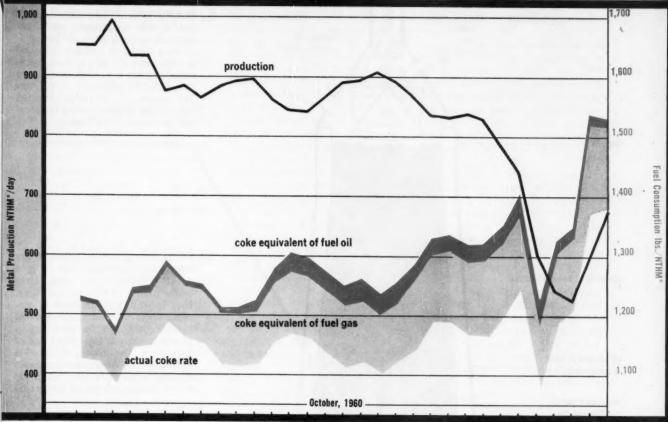
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Consumption of Natural Gas and Oil by C.F.&I.'s "F" Furnace



*NTHM: net ton of hot metal.

The Blast Furnace

The fuel chart above tells a story that has deep significance for the chemical process industries. It's about blast furnace "F" at Colorado Fuel and Iron Corp.'s Pueblo, Colo., mill, and it indicates lower coke requirements when natural gas and fuel oil are injected into the furnace to produce pig iron.

Ironmakers have a threefold interest in new injection techniques: (1) to cut operating costs by reducing coke needs, (2) to increase the capacity of existing blast furnaces, (3) to improve the quality of iron via better control.

Such injection systems are beginning to catch on in blast-furnace operations. Fuel oil and natural gas have proved out in tests by several producers. And oxygen is now receiving a full-scale test, also in CF&I's "F" furnace.

CF&I, which with Carbide's Linde Division, has been leading such experiments, has an interest in coke savings that is somewhat keener than that of Eastern iron producers. Located far from the nation's coal mines, CF&I pays a premium for coke—but the firm's experience indicates that savings can also be made in the East. As a result, other producers are following its lead; and it's a safe bet that by '65 natural gas, fuel oil and oxygen will be common fuels in blast-furnace operation.

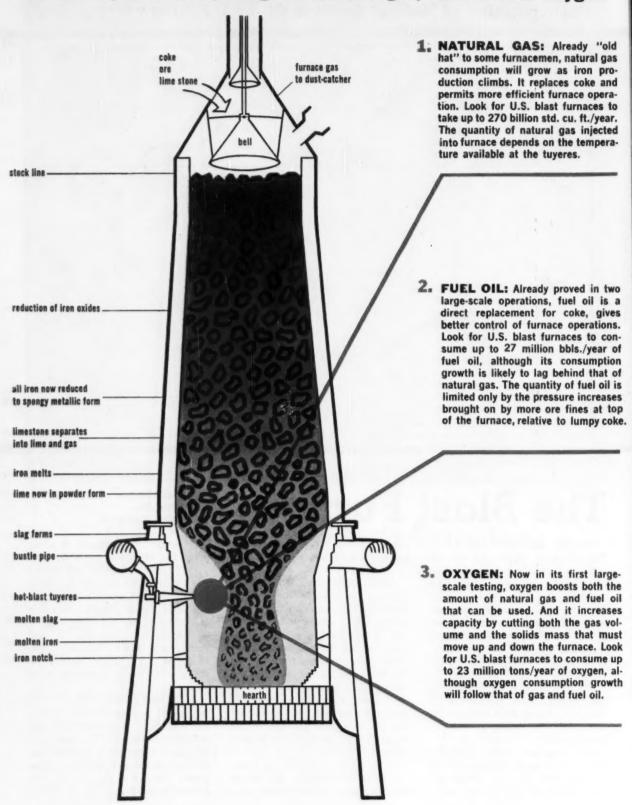
Implications to the CPI are many:
• Coke consumption will be reduced from its historic ratio of 1,600

New customer for fuel oil, gas and oxygen

lbs./ton of iron produced to about 1,350 lbs. when fuel oil is used; to 1,200 lbs. when fuel oil and natural gas are used; and to 1,000 lbs. when fuel oil, natural gas and oxygen are combined. Result: although coke is a standard necessity for ironmaking, it is unlikely that expansions in current capacity will be necessary. This, of course, will limit the capacity for the production of chemicals from coke.

• The steel industry will not need to expand its blast-furnace capacity for some time, and direct iron ore-reduction processes (CW, March 25, '61, p. 88) are likely to find slim pickings as the nation's iron output grows. The use of gas, oil and oxygen can boost the capacity of existing

At the tuyeres: an opening for natural gas, fuel oil and oxygen



furnaces by over 50% with little added investment.

· Natural gas consumption will grow. CF&I's experience shows that 1,000 std. cu. ft. of natural gas replaces 75 lbs. of coke (worth about 60¢). Thus natural gas will prove decidedly more economical as long as it sells for less than 60¢/1,000 std. cu. ft. However, involved technical factors limit natural gas consumption to 4-6% of the air blast without oxygen injection and about 3,000 std. cu. ft./ton of iron with oxygen injection. Allowing for a rebound in steel consumption (CW, June 24, p. 118), this may bring natural gas consumption for blast-furnace use to about 270 billion std. cu. ft./year.

• The growth in fuel oil consumption will follow closely that of natural gas. Each gallon of oil replaces about 13 lbs. of coke (worth 10¢), so fuel oil must sell for less if it is to be more economical than coke. Fuel oil has an advantage over gas, however, because it can be injected to its maximum limit (4-6%). Allowing 13 gal./ton of iron (anticipated by CF&I with oxygen injection), total fuel oil consumption may climb to about 27 million bbls./year.

• Oxygen is making a second bid to feed the blast furnaces—one that is likely to be successful. Ten years ago oxygen producers tried to convince ironmakers of the merit of using oxygen to enrich the air blast, cut down volume, save heat. But the ironmakers were cool to the idea. Now, if other companies confirm the results of CF&I's current tests showing that oxygen pays off as a supplement to natural gas and oil injection, oxygen use in blast furnaces may grow to about 23 million tons/year.

At the Tuyeres: Key to the new technique is tuyere injection. Natural gas, fuel oil and oxygen all enter the blast furnace through the tuyeres (see p. 66). Chemically, the reaction at this point resembles the partial oxidation reactions used to generate hydrogen or acetylene from fuel oil and natural gas (CW, Dec. 3, '60, p. 60). (The same partial combustion reaction applies to the coke as well.) In the furnace, partial combustion at the tuyere level provides heat to melt iron; at the same time, 30-60 ft. above the tuyeres, carbon monoxide gas (rising from partial combustion) reduces oxides in the ore, producing iron and carbon dioxide.

Since this last reaction is never 100% effective, however, a part of the carbon monoxide always leaves the top of the furnace in the "furnace gas," which has a resulting heating value of about 50-90 Btu./std. cu. t. Furnacemen recover this heat value by burning the furnace gas in egenerative - type checker brick "stoves" to heat the air blast going to the tuyeres.

These "stoves" are the focal point for use of natural gas in the furnace. Natural gas allows better heat economy through a hotter air blast. Hisorically, furnacemen operated their air blast at about 900 F. Using three stoves operating in parallel, they would bring one stove to about 1400 F, then switch it to heating air. While the bricks were hot, they bypassed part of the air to control temperature, gradually cutting back the bypass as the stove cooled off. A cycle lasted about three hours; there was rarely much extra heat to take care of emergencies; and excess furnace gas not burned in the stoves was used in boilers or to drive air compressors.

Brickmakers, however, are now turning out economical checker bricks that can withstand temperatures up to 2200 F. As the old bricks ourn out, furnacemen replace them with the high-temperature-resistant bricks, run their stoves hotter. There is much to be gained by this, for a blast furnace consumes about 3.5 tons of air for each ton of iron produced. Heating this air before it enters the furnace cuts down the drain on the partial oxidation inside, saves fuel.

But at the higher temperatures the chemical equilibrium in front of the tuyeres swings from partial to total oxidation. There is no carbon monoxide to reduce the ore around the tuyeres. Solution: add natural gas. The light hydrocarbons in the gas (either coke-oven or natural gas) go directly into carbon monoxide at the tuyeres, where it is needed. Experience at Pittsburgh Coke & Chemical Co. (CW, April 23, '60, p. 53) has shown the optimum amount of gas to be about 4% of the hot air-blast.

On the other hand, CF&I has attempted to reverse the emphasis in this process and use the maximum amount of natural gas to save coke. It has found that each 1% of gas in

the blast requires a temperature increase of about 75 F. Limited by the maximum temperature in its checker brick stoves (about 1500 F), it has overcome the temperature bottleneck, initially by adding fuel oil, now oxygen.

Carbon for Combustion: Fuel oil injection is also the answer to another problem. It helps control a "cold" furnace, whereas fuel gas is not high enough in carbon to yield the required heat. Adapting to continuous operation, CF&I has set up its furnaces using a steady maximum of natural gas, while fuel oil injection is varied as a control.

Following a different approach, Dominion Foundries & Steel, Ltd. (Hamilton, Ont.), has injected fuel oil without natural gas (CW, April 22, p. 83), using it as a direct replacement for coke. Consumption data reflects this. CF&I reports using about 1.4 gal. of fuel oil along with 1,277 std. cu. ft. of natural gas per ton of iron, while Dofasco uses 16 gal. (133 lbs.) of fuel oil per ton of iron.

Opening Up Oxygen: By far the most dramatic results are currently being turned out at CF&I in its full-scale test of oxygen enrichment. The Pueblo mill has a new, 280-tons/day Linde oxygen plant, originally installed to serve a steel converter (for turning blast-furnace, high-carbon iron into low-carbon steel). But since the steel converter isn't ready to run, CF&I and Linde decided to conduct full-scale oxygen tests in the "F" furnace. Result: capacity has shot up from 790 to 1,100 tons/day.

In this test, the company has used an air-blast enrichment of 6.5% (from 21% to 27.5% in air). Now it plans to go to 8% and to provide a new oxygen plant to serve its blast furnaces. When it does, the firm says: "We are confident we can increase pig iron production from the same ores by 50% (over that obtained with fuel gas-fuel oil injection) with a 20% saving in metallurgical coke.

This operation confirms computer studies made by Linde, which indicate how oxygen can improve blast-furnace operation. Oxygen enrichment will: (1) improve the over-all heat load on a blast furnace by cutting back the amount of inert nitrogen from the air (about 2.8 tons/ton of iron), which must be heated but serves no purpose; (2) allow more

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ENGINEERING

natural gas injection by converting the gas into carbon monoxide at the tuyeres; (3) allow better utilization of the heat available from fuel oil by promoting rapid combustion.

In addition, oxygen may break the bottleneck currently limiting fuel oil injection at Dofasco. As oil replaces coke, the increase of fine ore in the solids mass fed to the top of the furnace increases the pressure drop of the gases rising through the furnace. Dofasco is switching to sintered ore to overcome this; but oxygen enrichment can reduce the volume of gases, thus cut pressure drop without use of sintered ores.

Pillar of Coke: If the process industries are to predict which of these new fuels will be feeding the blast furnaces on a month-to-month basis, they will have to pay technical attention to this new customer. Most important are its practical operating problems.

Physically, a blast furnace can be regarded as a 100-ft.-high pillar of hard coke lumps, varying in temperature from steaming at the top to white hot at the bottom, where it rests on a pool of molten iron. This pillar is continually burned away at the bottom, so it continually settles, carrying iron and limestone down with it. It is unsteady at best. And any improvement in blast-furnace production must be tempered in practical operation:

A hot furnace. This is an easily handled furnace. The molten iron flows smoothly. Above the hearth the coke pillar is burned away for several feet in front of the hot air-blast tuyeres. The solids mass settles evenly, and there is relatively less danger of upsets. A furnace can be made "hot" by increasing the relative amount of coke to ore in the feed and, in the newer furnaces, by injecting fuel oil.

A cold furnace. This is the furnace-man's nemesis. The molten iron is gummy. It can stick in the runners, damming them up until it overflows onto the casting floor. Before entering the tuyeres, the pillar of coke is not burned away clear; and the sticky iron collects in pockets, so that only the hot air-blast keeps it from overflowing out through the tuyere into the "blowpipe," a cast-iron main carrying air to the tuyeres. Unfortunately, it takes 14-16 hours before a change in coke burden can bring a

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ENGINEERING

cold furnace back up to temperature; fuel oil injection will do it in six hours or less, even faster with oxygen injection.

A hanging furnace. The pressure of the air blast to the bottom of the furnace (15-20 psi) is sufficient to support almost the entire solids mass, when it is applied across the total cross-section of the furnace. When this happens, the furnace is "hanging." A hanging furnace is never stable; it "slips": solids shift and large bubbles of gas escape up, to burst out through the relief hatches, carrving up to 2 tons of ore and coke out with them. Hanging can occur at the top of the furnace, when the percentage of fine ore is too high to allow free passage of gases, above the tuyere, when the air blast is too hot. Injection of natural gas can avoid hanging at the tuyere level.

Inspecting Injection: Two designs have been developed for injecting fuel oil-one by CF&I and the other by Dofasco working with Esso Research. Natural gas is not much of a problem, can be injected directly into the hot air-blast behind the tuyeres. Fuel oil, however, tends to lay down a gummy coating on the inside of the tuyere, unless it is injected into the furnace proper.

To overcome this, CF&I has cast small pipes into the copper tuyeres, projecting them through to the inside at an angle that carries the injected stream to the center of the opening in the furnace. Both natural gas and fuel oil are injected through the same pipe. Dofasco has developed a lancepipe extending from the back of the blowpipe to the face of the tuyere inside the furnace.

With most of the nation's blast furnaces working at capacities as low as 50% during the past year, there has been less incentive to push fuelinjection systems. But with the current upswing in production (capacity rate is now about 70%), and the cost savings possible, more furnacemen will be taking notice. They will open the big new market for fuel oil, natural gas and oxygen producers.

The figures on potential volume of this new market are projected. And it may be some time before they are realized as the result of an industrywide switch-over. Meanwhile, furnacemen are studying powdered coal as an alternative to gas and oil.

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ENGINEERING

Cadmium-Zinc Maker

A new type of horizontal retort furnace to distil cadmium and zinc from their oxides has been developed by Companie des Metaux d'Overpelt (Overpelt, Belgium).

The firm says the new design has already demonstrated five advantages: (1) smoother, continuous operation; (2) higher yields of zinc and cadmium; (3) fuel savings; (4) reduced labor costs; (5) closer control. The new furnaces are being installed as older furnaces wear out.

Key to the new design is a condensing chamber built into the top of the furnace. In the furnace, 192 horizontal tubular retorts are arranged in four rows, one over the other. For charging, one end of the tube projects outside the furnace wall.

Inside, near the center, two sheetmetal curtains extend from end to end from the top of the retorts almost to the roof. They are tilted (forming an "A") to give wider clearance at the bottom, enabling vaporized zinc and cadmium leaving the open ends of the retorts to rise and pass over the top of the metal curtains into the condensing chamber.

The outside walls of the furnace form the condenser's heat-exchange surface. Vapors moving outward from the curtains come in contact with the walls above the retorts and condense to molten metal. This runs down the wall to be tapped off from fireclay-lined troughs running the length of the furnace. The zinc and cadmium can be recovered continuously, while the individual retorts are charged by batch.

Explosives Do Cutting

Shaped explosive charges, originally developed for military applications such as piercing armor plate, are being tried now for industrial demolition and metal cutting. Example: six linear-shaped explosive charges, weighing less than 1 lb. each, recently sped demolition of a large cracking unit at American Oil Co.'s refinery (Wood River, Ill.).

The charges, specially prepared and designed by Chromalloy Corp.'s Propellex Chemical Division (Edwardsville, Ill.), fit directly against the H beams supporting the structures, achieve deep penetration with little explosive.



ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

Saline Water Conversion Moves a Major Step Closer to Large-Scale Operation

Department of The Interior Selects Lummus to Evaluate Freezing Processes and Design Demonstration Plant

The Lummus Company has been selected as the architect-engineer for the East Coast saline water conversion plant which is to be erected at Wrightsville Beach, North Carolina, Secretary of the Interior Stewart L. Udall announced recently. The Wrightsville plant is the fifth in a series of five plants authorized in 1958 by Congress to demonstrate the engineering, reliability, and economic potentials of the most promising conversion processes in existence today.

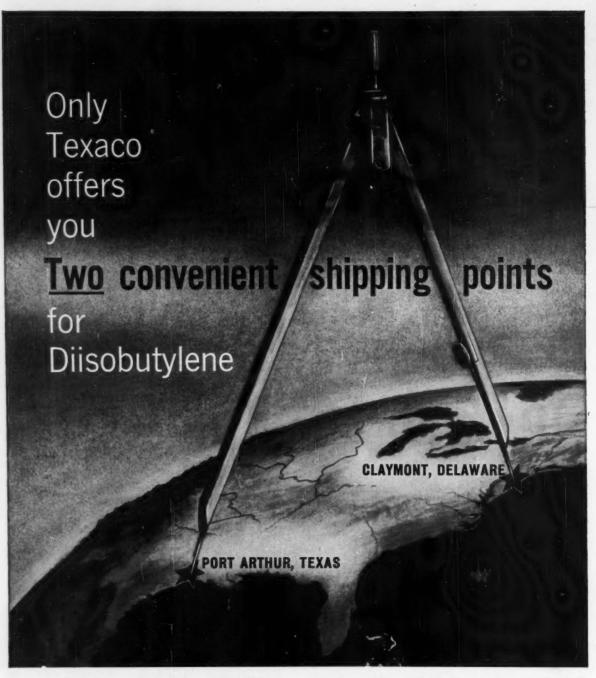
The contract awarded to Lummus calls for an evaluation of the *freezing* processes of saline water conversion. (Of the other plants in the series, three will use various distillation processes and one an electrodialysis process.)

The initial activity of Lummus' contract will require preliminary engineering service to prepare estimated plant costs, layouts, and reports. A second phase will include the design of the plant to permit issuance of specifications for the construction of the demonstration plant as well as consultation with the Office of Saline Water on matters relative to awarding a construction contract for the plant.

Lummus was chosen from a group of 35 engineering firms considered for the assignment on the basis of its experience in such parallel fields of technology as refrigeration, heat transfer and crystallization. "Product" from the plant will be water of a quality suitable for municipal, industrial or other beneficial consumption. Production rate will be 250,000 gallons per day.

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Seeking New Ways Out of the Literature Clutter

New developments signify progress on one of technology's toughest problems: dissemination and retrieval of information. The advances-mainly modifications of programs begun some time ago-range from improved abstracting systems to more flexible chemical nomenclature plans. All are designed to help researchers keep closer tabs on the data in past and current issues of the world's 25,000 scientific journals.

In the chemical field, the job is complicated by the need for researchers to keep fully informed on the 25,000 new compounds synthesized yearly, stay up to date on old ones.

Latest twist in IR (Information Retrieval-the broad term for all aspects of information flow) comes from a company specializing in technical literature, the Institute for Scientific Information (Philadelphia). ISI now has a speedy graphical indexing or cataloguing system, devised by its director, Eugene Garfield, for its Index Chemicus service (IC is a biweekly journal of abstracts in certain areas of organic chemistry). The plan is aimed at reducing the confusion caused by such things as the present organic nomenclature system, by which the same compound can be called by several names, correctlye.g., phenylnaphthyl ketone, benzoylnaphthalene, naphthoylbenzene, etc.

More Codes: American Chemical Society, too, is building a new program around a new notation plan, the International Chemical Notation, which is the product of a 10-year program of the International Union of Pure and Applied Chemistry. The code will permit the filing of compound data on punched cards. The symbols of this notation system, detailed in a book to be published this fall by Longmans, Green and Co., Ltd. (London) can be typed on punched cards, and machines now available are said to be capable of reading these chemical notations at a 600 "word"/minute speed.

ACS's Chemical Abstract staff is now using the new notation system in setting up its own files. But the society hasn't yet decided how far it will carry the plan (e.g., whether to convert CA to it). One service con-

> Researchers need straighter routes for retrieval of published information.



How two chemical indexing systems abstract an article.

Properties of the acetylene group bound to a pyrious ring. A. N. Kost, P. B. Terent'ev, and T. Zavada (M. V. Lomonosov State Univ., Moscow). Doblody Adad. Nawh. S.S.S.R. 130, 236–81980); cf. Alberts and Bachman, C.A. 29, 58139—To 119 g. 2-methyl-5-vinylpyridine in 24g. AcOH was added at 0° 190 g. Br and after 1 hr. the mist was quenched in H₂O to yield after usual treatment 54°, methyl-5-(1-bromoethenyl)pyridine, m. 8° by 103–4° methyl-5-(1-bromoethenyl)pyridine, m. 8° by 103–4° methyl-5-(1-bromoethenyl)pyridine, m. 8° by 103–4° micrate m. 167°. When the reas C.A. 28, 38139—10 117 g. comp. C.A. 28, 38139—10 117 g. comp. C.A. 28, 38139—10 118 g. Ber and after 1 hr. the mixtowas quenched in H₂O to yield after usual treatment 54% Comethyl-5-(1-bromoethenyl)pyndine, m. 8°, by 103–4°, 18° 1. 1820, dg. 1.4184; pierate m. 167°. When the reaction mixt. above was treated with KOH in MeOH, there was also shown to be supported by the comparison of the

Chemical Abstracts, of the American Chemical Society, covers a broader area-articles and patents in all fields of chemistry and chemical engineering. It abstracts pertinent articles in detail, presenting them in text, as shown (reduced). Each issue has an author and patent number index; annual and five-year indexes include those as well as indexes according to subject, molecular formula and organic ring index. The publication lag is said to be three to five months. Cost per year: \$40-\$925.

Both indexes are published every other week.

PROPERTIES OF ACETYLENIC GROUPS ATTACHED TO THE PYRIDINE NUCLEUS. A. N. Kost, P. B. Terent'ev, T. Zavada, (Moscow St. Univ.) Recd. Sept. 12, 1959. Dokl. Akad. Nauk. S.S.S.R., 130, 326–328(1960).

Index Chemicus, published by the Institute for Scientific Information, abstracts articles in journals pertaining to organic chemistry, primarily the new compounds and their synthesis. The abstracts are presented, as shown (reduced), graphically with some words and formulas. Author and formula indexes are included in each issue and then accumulated in quarterly and annual issues. Index Chemicus, reportedly carries the abstract one month after publication of the original article. Cost: \$40-\$500/year, depending on the number of per-copy subscriptions.

templated, once CA's office has been changed to the new system, will provide on request all of CA's data on compounds of a specific type.

And the American Institute of Chemical Engineers is also plugging a new program for classifying and filing technical information. Based on key words-a thesaurus of which is soon to be published-the plan is now being applied to one of AIChE's own publications. Subscribers can use these key words to file articles in their own card or machine retrieval systems.

Broad Problem: The field of organic chemistry is burdened with more than the usual share of IR problems. A story is now making the rounds that one executive, discouraged by present inadequate literaturesearching methods, o.k.'s experiments costing up to \$100,000 to avoid having his men search to see if the work has been done before. IR in organic chemistry is so complex, in fact, that there are many opportunities to improve it in one special area or another. The success of Garfield's ISI points this up, and examination of its new programs shows how some of the broader problems of IR are now being tackled.

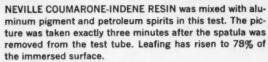
Filling a Hole: As a commercial indexer, ISI's chemical efforts are directed at providing services that others-e.g., ACS's Chemical Abstracts-do not. That's one reason why ISI's Index Chemicus stresses promptness in reporting on articles in current chemical publications.

Garfield has devised a sort of graphical chemical "grammar," which is taught to his staff of reviewers. It is his view that organic chemists read structural formulas faster than the words used to describe formulas.

His comparatively simple way of translating the structural name of a compound-no matter what it is called-into a molecular formula is the key to the IC operation. In some cases, this job takes even an experienced abstracter 10-20 minutes. Once this is done, however, the reviewer can quickly make his abstract, list the article under author and formula for the Index Chemicus.

Garfield also claims that by his new plan for using the elements of







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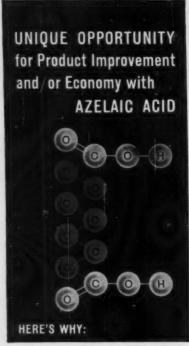
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RESEARCH

chemical terminology—e.g., prefixes and suffixes such as "meth," "pent," "oic," and "ane,"—and defining them in terms of atomic constituents—his indexes can be utilized by computers. (Garfield will use a Remington Rand Univac). This development, designed to further speed the publication of abstracts at relatively low cost, will permit ISI to expand, cover more areas of organic chemistry. Garfield hopes to do this within the year.

Not So Deep: A faster, but shallower, type of coverage of the articles in key journals has been offered for some time by ISI and a number of other companies. Every week or so, they reproduce the contents pages of current journals (ISI also includes a list of author addresses). ACS does a somewhat similar job, it offers a list of titles of articles from current journals. Unlike ISI, however, ACS does not offer to supply copies of the journal from which the titles are taken.

ACS, however, combines its title plan (Chemical Titles) with an indexing system. This includes a listing by author, and more important, a "Keyword-in-Context (KWIC)" Index, developed by International Business Machines' H. Peter Luhn.

Broader Base: Citations—i.e., all works, in all fields, published subsequent to a certain article, which refer to that article—will be listed in a system ISI is currently devising. Working under a \$300,000 grant from the National Science Foundation and the National Institutes of Health, the company hopes to offer soon a pilot work of this sort in the field of genetics.

Better Equipment: Several well-established IR systems have been improved recently by addition of better equipment. Western Reserve University (Cleveland), for example, has now put a computer, a General Electric GE-225, to work at automatic literature searching (CW, Feb. 20, '60, p. 75).

The GE-225 will take control of a system worked out several years ago for the American Society of Metals (Cleveland). Its job is to index for easy reference the 12,000 titles covered each year in ASM's Review of Metal Literature.

Do It Yourself: Many chemical companies have devised their own IR systems. Among them: Du Pont, which has a plan called "coordinate

indexing," Esso, Dow, Monsanto and Smith Kline & French. The latter devotes an estimated 10% of its research budget to IR.

Computer manufacturers are eager to aid companies in developing indexing systems that will use their computers. IBM's H. Peter Luhn and T. R. Savage devised one such broad-range plan-Selective Dissemination of Information (SDI). Using a key word list, each chemist in a company is "profiled"—his areas of interest are filed in the computer. As journals are received, each article is also profiled, indexed with the same type of key words. The article index is machinecompared to the key words (filed in the machine) relating to the chemists, and those articles that have enough of the key words in the researcher's profile are sent to him automatically.

Coordination: The variety of plans devised so far have, to a degree, complicated an already complex situation. The U.S. government, through the National Federation of Science Abstracting and Indexing Services, formed in '58, is devoting some effort to the study and coordination of the IR work of various groups.

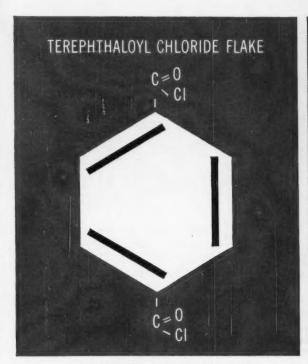
It's not simply confining its study to U.S. indexing plans; it is also making a survey of Japanese concepts and methods in handling IR. A primary purpose: to develop closer cooperation, along voluntary, nongovernmental lines, between the Japanese scientific and technical community and its U.S. counterpart.

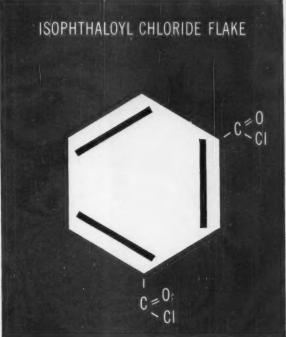
Other IR work in the government includes the Bureau of Standards' invention of machine retrieval devices. Just revealed is an electromechanical searching system that uses punched cards, provides a searcher with a microfilm image of abstracts and citations.

The National Science Foundation issues a semiannual progress report on IR; Current Research and Development in Scientific Documentation presents material under the categories of information requirement and uses, information storage and retrieval, mechanical translation, equipment and potentially related research.

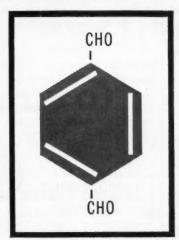
Decade Ahead: Today, the field of IR is compared to the field of EDP (Electronic Data Processing) 10 years ago. Just as virtually every industrial enterprise now has some kind of mechanized accounting, in 10 years

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RESEARCH

every firm will have IR systems.

The Stanford Research Institute says that about \$2 million worth of machines for IR were sold during '60. In '65, SRI predicts, the market will be \$150 million/year.

The only basic roadblock to wider use of IR—besides the usual resistance to change—is the lack of clear-cut evidence of how much it could save. There is no way to pinpoint just how much money might be saved by IR—or even how much is wasted by present inefficient plans. Different sources say the waste due to poor IR ranges from as little as 10% of R&D expense to 80%.

One expert estimates that good IR would cost \$1/day/man, above the conventional library and associated costs. And when this is matched against savings, IR becomes a heavy favorite to win wide application.

EXPANSION

· A worldwide network of irradiation service centers is being established, initially in Paris, Tokyo and New York. The project is a joint effort by Westrex Corp., a division of LITTON Industries (Beverly Hills, Calif.), Radiation Dynamics, Inc. (Westbury, N.Y.), C. Itoh Corp. (Tokyo) and others. Purpose of the centers: scientific research and commercial processing with atomic radiation. President of Radiation Dynamics, Kennard H. Morganstern, says that his firm's Dynamitron, a 1-million-volt particle accelerator, permits economical use of radiation processing on mass-produced items. The accelerator generates a high-voltage beam of electrons that is "sprayed" through a material to change its physical structure.

• Union Carbide Corp.'s Research Institute staff has just been consolidated in a new laboratory building in Eastview, N.Y. The move brings together 60 scientists, who were previously scattered at four Carbide labs.

• India's first private pharmaceutical research center is being built. Ciba (India), associate of the Swiss firm, will do both basic and practical research at a laboratory scheduled for completion in '63. Initial work will be done on dyestuffs and pharmaceuticals, including the investigation of Indian medicinal plants and the improvement of new synthetic medicines.

VERSATILE, POWERFUL DISPERSING AGENTS

LOMAR

series of naphthalene sulfonic acid condensates



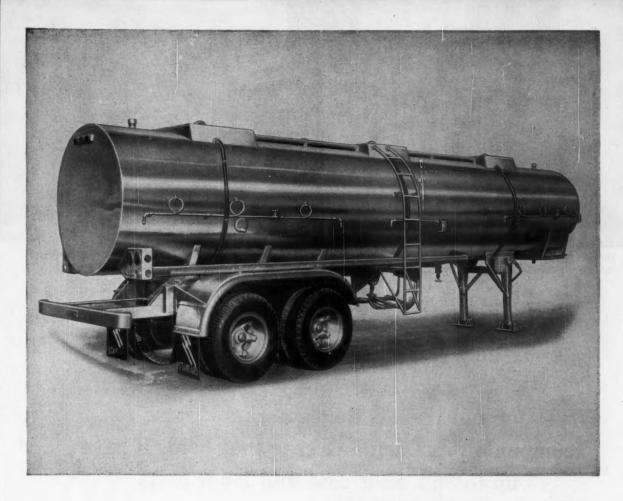
The Lomar series supply the powerful dispersing properties required to handle dyes, pigments, clays, graphite, mica, carbon black, and other inert powders. They improve manufacturing processes as well as finished products in fields involving:

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Pitch and slime control in papermaking
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Foundries
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New! We have just published a booklet on the Lomar series. It contains full information on this valuable line of dispersing agents. Send for a free copy today.



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Its-The Rings

THAT MAKE THE DIFFERENCE ____

Another "Haul Mark" design from Standard is this stainless steel chemical transport, one of two delivered to McKenzie Tank Lines, Tallahassee, Florida.

A new and unique feature is the steam manifold connecting the pressure tight ring formers providing steam heating facilities with no weight penalty. Use of ring formers as steam conductors is a feature introduced and perfected by Standard.

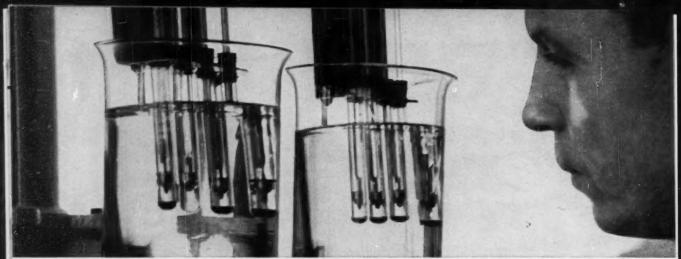
Designed to carry various chemicals, these trailers have stainless inner shell and stainless jacket with 3" of glass fibre insulation between. Steam manifold lines are copper, installed to enable the operator to heat each compartment individually.

Standard Steel engineers will design a "Haul Mark" tank to meet your special requirements. A phone call or letter describing your problem will get immediate response.



Standard Steel Works, Inc.

- · NORTH KANSAS CITY, MO.
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- . SPARTANBURG, SOUTH CAROLINA



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from let) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

There is no soap in Darina Grease.

No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel – a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the

grease does not soften. It shrugs off water-won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machin-

ery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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Market

Newsletter

CHEMICAL WEEK July 8, 1961 Fire aboard the naphthalene-carrying Polish freighter Polanica as it was unloading its cargo at Philadelphia last week spotlights the critical naphthalene shortage U.S. phthalic makers have been coping with for months. The *Polanica* is only one of several ships that have been pouring naphthalene into U.S. ports from Communist countries.

The material was consigned to Allied Chemical. Allied, however, had not yet taken delivery from broker Denimex Development. Quantity and cost of the naphthalene cargo is not being revealed, but an Allied official admits that it was "very high-priced material."

More than a million pounds of naphthalene may have been aboard the *Polanica* and, based on known price tags of previous shipments of Communist material, cost/pound was in the neighborhood of 15ϕ , compared with domestic crude cost of about $6\frac{1}{2}\phi$ /lb.—when available.

A rash of fertilizer nitrogen expansions are breaking out throughout the U.S. New ammonia plants, for example, may well add more than 800,000 tons to current U.S. capacity (some 5.2 million tons) by the end of '62.

Add these to last week's fertilizer growth disclosures (CW Business Newsletter, July 1):

Southern Nitrogen will spend about \$5 million to boost output of its agricultural products in the Southeast. At its Savannah, Ga., works, anhydrous ammonia capacity will be increased 50%—to 150,000 tons/year; this, plus capacity at Tampa, says President John Riley, will make Southern Nitrogen "the third-largest ammonia processor east of the Mississippi." The firm is also expanding its nitric acid and ammonium nitrate production at Savannah, at a cost of \$1.3 million.

Escambia Chemical is expanding in ammonia and methanol, and has let a contract—to Chemical Construction Corp.—for a 50 tons/day urea solution plant at Pensacola, Fla. The ammonia unit will be increased to 230 tons/day from a present 200 tons. Installed methanol capacity, now 16 million gal./year, will be hiked to 22 million.

Spencer Chemical will put up a new high-analysis fertilizer plant at its Jayhawk Works near Pittsburg, Kan. The installation will turn out more than 50,000 tons/year of material containing 30% nitrogen and 10% phosphorus. Operation is scheduled for next year.

Lead antiknock compound prices were cut again by major makers Du Pont and Ethyl Corp. These reductions (averaging about 1½%) add to the previous week's slashes, which brought tags on tetraethyl lead, tetra-

Market Newsletter

(Continued)

methyl lead and mixed lead alkyls down 5% across the board (CW Market Newsletter, July 1).

The reductions, although officially explained as an effort "to expand the market," were probably induced by industry overcapacity.

The price of Teflon molding powder is still firm. Hefty price cuts last week in various products made from the tetrafluoroethylene resin touched off speculation that Du Pont had reduced Teflon prices (CW Market Newsletter, July 1). However, the company states that it has made no price cuts recently, although it points out that reductions of about 30% may take place during the next few years as production economics—brought about by rising volume—come into play.

Japan is resuming chemical trade with Red China. Last week the Japanese chemical firm Kanegafuchi Chemical landed a vinyl chloride export contract with the Red Chinese for 600 tons, valued at about \$240,000. And a follow-up order is expected soon. The deal is considered a major breakthrough in trade relations between the two countries, may mark the beginning of closer economic ties between these two powers. There has been no trade between Japan and Red China since '58.

A 50-million-lbs./year caprolactam plant was brought onstream last week by Du Pont at Beaumont, Tex. Du Pont says that most of the output—used in nylon-6 fiber production—has already been contracted for, adding that it has no immediate plans for making nylon-6 fiber. (Du Pont produces nylon-6/6 material.)

The contract price, $45 \frac{e}{l}$ lb. f.o.b. Beaumont, will be maintained through '62. The firm says it will offer the material in '63 at about $41 \frac{e}{l}$ lb.

Since Du Pont revealed plans to construct its caprolactam unit in '58, the price of the chemical has dropped steadily. At that time the material was selling for 57 e/lb, and only a month ago the official price tag was 52 e/lb.

Rosin prices may firm up, stabilize within a \$12-14/cwt. range during the remainder of the year. That's the hope among co-op members of the powerful American Turpentine Farmers Assn.

A series of gum rosin price cuts in recent months sparked an association recommendation that members move their material into the government loan program if a price tag of \$11.50/cwt. couldn't be maintained. Apparently it couldn't be. Last week CCC stocks had climbed to more than 18,000 drums, a sizable flow since March, when stocks were depleted. The increase is one of the price props ATFA is counting on.

Phillips Petroleum will build a \$1.5-2 million alkylation unit at its Woods Cross, Utah, refinery. Output will go into high-octane gasolines for sale in the Intermountain and Pacific Northwest areas.



And now. polyurethane lacquers

Polyurethane lacquers are creating great interest in the surface coatings industry. A properly formulated lacquer produces a coating that is hard and tough . . . and has excellent resistance to abrasion, corrosion, and weathering. These coatings can be applied by spray or brush and have potential value in almost every consumer and industrial application.

A critical problem in formulating urethane lacquers is the quality of the solvents used. If the urethane reacts with acid or water in the solvent system, carbon dioxide may be formed ...thus creating bubbles in the coating.

To meet the high purity solvent requirements for urethane lacquers, CARBIDE is marketing two new acetate solvents-Cellosolve Acetate, 99% (Polyurethane Grade), and Ethyl Acetate, 99.5% (Polyurethane Grade). Water content is kept below 0.05% by weight and free ethanol does not exceed 0.01% by weight. Thus, reactive hydrogen is kept to a minimum.

Here are the complete specifications that must be met before Cellosolve Acetate, 99% and Ethyl Acetate, 99.5% are shipped to you.

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	CELLOSOLVE Acetate, 99%	Ethyl Acetate 99.5% *
Purity,		
% by wt., min.	99.0	99.5
Acidity		
(as acetic),		
% by wt., max.	0.02	0.0005
Water,		
% by wt., max.	0.05	0.05
Free Ethanol,		
by diff.,		
% by wt., max.	None	0.01
Nonvolatile		
matter,		
% by wt., max.	None	0.01
Color,		
Pt-Co, max.	15	10
Distillation,		
760 mm Hg		
1 bp, min.	150.0° C.	75.5° C.
Dp, max.	160.0° C.	78.0° C.
Odor	Mild	Esteric, fruit
		non-residual

For further information, check the coupon for CARBIDE's technical information bulletin on Urethane Solvents.

*Polyurethane Grade

Reminder to drug makers

Numerous pharmaceutical products can be synthesized from alkylene amines. Solutions of aminophylline, a salt used for treating cardiac ailments, can be prepared from ethylene dia-mine with theophylline. The ethylene diamine also serves to stabilize the

Antihistamines and imidazoline derivatives, used for treatment of circulatory disturbances, can be obtained by using ethylene diamine and sub-



stituted ethylene diamines as starting materials. Many other types of pharmacologically active agents can be prepared from alkylene amines. More information on these useful CARBIDE chemicals can be found in a new booklet, available now. Check the coupon for your copy.

Gas dehydrating with glycols

Natural gas produced from most wells contains water. Both the liquid phase and the water vapor must be removed in order to prevent the formation of hydrocarbon hydrates which would block gas transmission lines. The easiest and most common way to do this is by passing the gas through a glycol solution.

Both diethylene and triethylene glycols are used to remove moisture from natural gas before it enters the pipeline. Triethylene glycol is also used as a liquid desiccant in small packaged plants at the gas well head to eliminate the need for alcohol injection or line heaters in field gathering systems.

Dehydration units using diethylene

glycol and triethylene glycol have the advantages of low investment cost and simplicity of operation. A further advantage is that glycols are not corrosive to the carbon steel used in gas field equipment. Thus, most glycol units operate without trouble year in and year out.

CARBIDE maintains an extensive engineering service group to help natural gas producers get the best possible gas dehydration efficiency with CAR-BIDE's diethylene glycol and triethylene glycol. As a part of this service, a comprehensive bibliography of articles devoted to improving gas dehydration operations is available. Compiled by CARBIDE, this publication lists every major article on gas dehydration since 1931. To obtain a copy, check the coupon for Technical Information Bulletin F-9289.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Com-pany, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

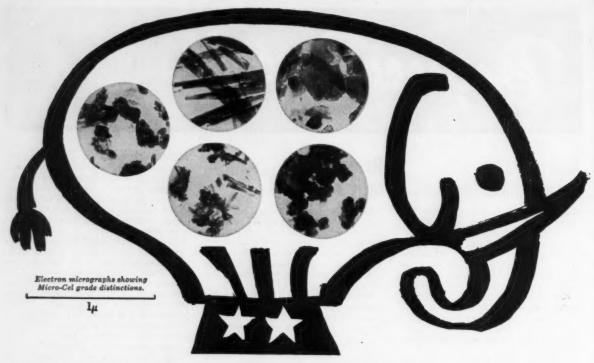
☐ Urethane Solvents. ☐ Alkylene Amines. ☐ Bulletin F-9289 (Gas Dehydration).

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Company	
Street	
City	Zone

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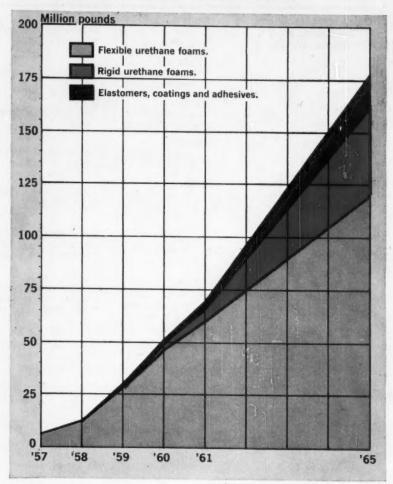




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How Polyether Demand Breaks Down



Riding High on Foams

This week Allied added its name to the polyether producers' list by bringing onstream a 20-million lbs./year unit at Baton Rouge, La. The venture—which enables Allied to supply all the basic raw materials of urethane manufacture: isocyanates, polyesters, polyethers and fluorocarbon blowing agents—underscores the swiftly achieved prominence of the polyethers in this field.

Urethane makers' rapidly accelerating demand for the polyethers undoubtedly stimulated Allied's move; '61's consumption of these materials will be an estimated 69 million lbs., 11 times the '57 level of 6 million

lbs. And by '65 demand should surge to about 177 million lbs. as the polyethers win a big segment of the rigid and elastomeric urethane business.

Although major markets for the ethers seem assured, in-place production capacity now is adequate for all expected market requirements during the next five years. The seven major polyether producers have a combined potential of at least 200 million lbs./-year, and most plants can be easily expanded.

Flexible Demand: The flexiblefoam market, first won by the polyethers because of their low cost (e.g., polyesters cost about 46¢/lb.; polyethers, 23-29¢/lb.), promises to remain the major polyether market for at least the next five years. In '60 almost 50 million lbs. of polyesters went into flexible-foam manufacture—an eightfold increase over '57 demand—as flexible-foam output rose from 16 million to about 85 million lbs.

The switch from polyesters to polyethers in the flexibles was swift. Right now the polyester share of the market has been whittled down to about 20% by the cheaper polyethers.

Market forecasters see a continued fast buildup in the amount of flexible-urethane foam going into automobiles, furniture and bedding. By '65 demand will likely reach about 190 million lbs. and polyether consumption will probably advance to at least 120 million lbs./year.

Rigid Attention: While flexible urethane foams have been the major factor behind the steep rise of the polyether demand, the markets for rigids, elastomers and other urethane products are expected to grow smartly. Polyethers will capture a hefty slice of this raw-material business. Rigid urethane foam production hit only about 10 million lbs. in '60. But by '65 production will likely reach 100 million lbs./year.

Polyethers are relatively new in rigid urethane foam formulation. Two years ago only experimental rigids were made with polyethers. In '60, however, about 40% of the rigid urethane products were based on polyethers; polyether use in this market segment reached about 2.5 million lbs. By '65, forecasters say, at least 70% of the rigid urethane market will be won by polyethers—the market may well advance to over 42 million lbs./year—almost 40 million lbs. more than in '60.

Cold Calculations: The major immediate growth area for the rigids still lies in home refrigeration, but both the construction (e.g., insulation) and boating fields also offer considerable potential. Home refrigeration alone consumed about one-third of the rigids produced in '60 and by '65 its share will probably increase to 50 million lbs./year.

The major advantage of urethane insulation is its low installation cost (Text continues on p. 90)



SOLIDS-IN-WATER SUSPENSIONS

The Marasperses act to prevent, or minimize, flocculation of insoluble particles in water suspension. The addition of as little as .05% to 3.0% of Marasperse (based on weight of total solids) will -

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- b. change a viscous pasty mass to a free-flowing liquid, or
- c. decrease the amount of water required to fluidize slurries.

Because of the potency of Marasperse, only the state of the mass is changed. The volume is not appreciably affected.

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MARKETS

Major Polyether Producers

Products

Description

Union Carbide Chemicals Charleston, W. Va. Institute, W. Va.

Diols Niax diol series (four products)

Polypropylene glycols M.W. 425-4025

Triols Niax triol series (ten products)

Propylene oxide derivatives M.W. 440-5000

Pentols Niax Pentol series

Propylene oxide derivatives

(two products) Hexol Niax Hexol LS

490

Polypropylene glycol adduct of sorbitol M.W. 700

Wyandotte Chemicals Wyandotte, Mich. Washington, N.J.

Diols Pluracol and Pluronic series (seven products)

Polypropylene glycols M.W. 410-2500

Pluracol series (eight products) Polypropylene glycol adducts of trimethylolpropane and glycerin

Tetrois Pluracol and Tetronic series (five products)

Polypropylene glycol adducts of pentaerythritol and ethylene diamine

Quadrol 292

M.W. 400-4500 N,N,N,'N,' tetrakis-(2-hydroxy - propyl) - ethylene diamine

Hexols Pluracol series (two products)

Polypropylene glycol adducts of sorbitol

Dow Chemical Freeport, Tex.

Diol Voranoi p-2000

Polypropylene glycol M.W. 1950-2050

Triols Voranol series (five products)

Polypropylene glycols M.W. 2500-5250

Olin Mathieson Brandenburg, Ky.

Diols Poly G series (three products)

Polypropylene glycol M.W. 400-2000

Triols Poly G series (three products)

Polypropylene glycol adducts of glycerin M.W. 100-4000

Jefferson Chemical Austin, Tex. Conroe, Tex.

Diols (two products)

Triols

Polypropylene glycol M.W. 400-2000

Atlas Chemical Wilmington, Del. Triol G series (five products) Polypropylene glycol adducts of glycerin

Hexols Sorbitol polyether G series (three products)

Polypropylene glycol adducts of sorbitol

Allied Chemical Baton Rouge, La.

Diol Actol 21-56

Polypropylene glycol M.W. 2000

Triol Actol 31-56

Polypropylene glycol M.W. 3000

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Chlor-Alkali Division

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(Text continued from p. 87)
—largely a result of the easy fashion in which it can be foamed in place.
On-site foaming is attractive, too, to the marine industry. Boat builders are expected to step into the No. 2 consumer spot with demand for over 20 million lbs. by '65.

While building construction represents the biggest potential demand it appears to be the hardest market to crack, and few market forecasters count on it for the near future.

Stretching for Markets: The other urethane products include elastomers, coatings and adhesives. Elastomers show by far the greatest growth possibilities because of (1) the growing market acceptance of moldable and extrudable elastomers; (2) increasing acceptance of urethane fibers (spandex); (3) renewed optimism for early commercial production of urethane tires (CW, June 3 p. 79). But researchers spearheading the effort on these elastomeric materials currently feel that polyesters, not polyethers, show greater promise as raw materials for these elastomeric polymers. Nonetheless, polyethers are expected to carve a piece of the total elastomer market-about 15 million lbs. by '65 is a typical forecast.

Intramural Strife: The fight among the different polyethers for a share of the total market is far less clear cut than the battle between polyethers and polyesters. There are seven major polyether producers with 64 tradenamed products (table, p. 88) offered to urethane makers. These products vary from diols to hexols with molecular weights ranging from the low hundreds to over 5,000.

The triols currently have the lion's share of the flexible-foam market, which they took from diols largely because the triols (Allied now has one of each, hopes to offer more soon) seem to be more amenable to one-shot processing. Consensus: this trend to triols will continue for at least the next five years.

In the rigid-foam area, the higher functional materials such as the hexols are making the greatest strides. But it is still difficult to determine which of the hydroxy-rich polyethers will carve the biggest share of elastomer coating and adhesive markets.

Whichever polyether wins the battle, one thing is sure—the polyethers as a group will continue to boom.



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Men who are interested in new product development will find INDOPOL Polybutenes interesting chemicals to investigate. The INDOPOL Polybutenes are a series of liquid hydrocarbons which are largely mono-olefinic (85-98%). Eight viscosity grades are available from Amoco Chemicals in tank car and drum quantities.

The INDOPOLS are stable, light colored materials. They are non drying and, at extremely high temperatures, decompose completely, leaving no residue.

Products with which INDOPOL Polybutenes are compatible include: hydrocarbon polymers, natural gums, pitches, rosins and waxes. Additionally, they are compatible with many alkyds, phenol condensation products and with styrene copolymers. They are soluble in hydrocarbon and chlorinated hydrocarbon solvents and many ethers and esters—emulsifiable with anionic, cationic or non-ionic agents.

For additional information about INDOPOL Polybutenes and/or a sample, contact your Amoco Chemicals representative. Or use the coupon.

INDOPOL Grade	Viscosity (S.S.U.)
1-10	114 at 100° F.
L-50	516
L-100	1,040 "
H-35	375 at 210° F.
H-100	1,070 ~
H-300	3,000
H-1500	15,000 "
H-1900	20 500 "



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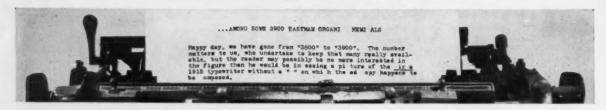
Possible Application.

Name

Position...

Company_

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The laborer is worthy of his hire

A new method has recently come out for introducing an aldehyde group by a two-step reaction. One of its authors has kindly informed us that one of our products, p-Dimethylaminobenzaldehyde (Eastman 95), does a fine job of supplying the formyl group. We will gladly supply an abstract of the procedure on request.

p-Dimethylaminobenzaldehyde is one of our products, but we don't make it. We buy it from a company that synthesizes it in large quantities for purposes of its own and is not set up to purify and market it in little dribbles as we do. We see no point in hiding the fact that it makes better sense for us to buy and purify many a compound we once had to synthesize ourselves. We assume the same full responsibility for its quality and further earn our hire by continually reviewing and revising purification methods.

Plenty of good, clean quinoline

We have always loved to run that most wonderful of "name" reactions, the Skraup.

We can remember when we were younger lugging those 22-liter flasks. We distinctly remember that they weighed 76 pounds because we remember weighing one out of curiosity one day. It occurs to us now that we were stronger and luckier than we were smart. A little slip while wrestling that much hot sulfuric acid would have been bad for our complexion. Other ingredients of Skraup brew were aniline, glycerine, and nitrobenzene. The sulfuric acid dehydrates the glycerine to acrolein, the acrolein cyclizes against the benzene ring of the aniline, the sulfuric acid grabs off a third molecule of water, and the nitrobenzene oxidizes off two hydrogen atoms. The chain of events starts quietly enough but picks up considerable exothermic enthusiasm. Result: quinoline,

It was an exhilarating affair, particularly when we succeeded in pushing the yield close to 100%. Then we passed 100%, which was even more exhilarating. This we explained by assuming that the nitrobenzene was being reduced to more aniline

for participation in the reaction. (Zdenko Hans Skraup would have been justifiably provoked with us for tortuous reasoning. His original proposal was merely to react nitrobenzene, glycerine, and sulfuric acid. Later, aniline was included.)

Striving for elegance and scorning plain water, we even discovered and published the fact that ferrous sulfate would serve to moderate the Skraup, though we now suspect the water of hydration in the ferrous sulfate was doing the moderating. Anyway, we took pride in the efficiency with which we could furnish the world plenty of good, clean quinoline, a compound once considered the foulest of coal-tar derivatives.

Now it appears that good, clean quinoline is going to be needed more than ever. A new analytical method for determination of phosphorus in fertilizers is based on the discovery that quinolinium phosphomolybdate ((C₀H₇N)₈H₂PO₄·12MoO₃) is of constant composition, very insoluble, and free of occluded cations. It can be dried and weighed for a gravimetric determination or titrated with NaOH for a volumetric determination. Some fertilizer-trade laboratories and state control labs make as many as 10,000 phosphorus determinations a year. If they will buy in 5-kg lots, they can do them with 2¢ worth of our Quinoline (Eastman 218) per determination. Free procedural abstract on request.

Infiltrated by solid-staters

You can now buy Anthracene as Eastman H480 for \$1200 per kilogram. The prefix "H" stands for hyper-pure. Replace the "H" by "P" for Practical, and the price drops to \$6.70 per kg. With "X" prefixed, the price shoots up again to \$25.75 for 100 grams because the product is then purified to exhibit a proper blue-green fluorescence. Leave off all prefixes and you get the Eastman Grade at \$10.85 for 100g. This is defined as "essentially free from isomers, homologs, and impurities." That "essentially" leaves a little essential room for maneuver. If say 99% of the organic molecules in a bottle are of identical species, most organic chemists would consent to labeling it essentially pure.

But now there has sprung up a breed

of organic physical chemists to whom a substance that is only 99% pure is like a pail of garbage. Some of them are even to be found in the Kodak Research Laboratories, which is (or are) where Eastman Organic Chemicals are made.

At their behest o-Benzoylbenzoic Acid (Eastman 2242) was cyclized with sulfuric acid to make anthraquinone, that reduced with tin and HCl to anthrone, and that reduced with zinc and dilute NaOH to anthracene. This, with much purification and repurification along the way, we call Eastman H480.

For the solid-staters it was only the beginning. They recrystallized it from toluene, got rid of the toluene by a special technique, and zone-refined a dozen times or so. Then by Bridgeman technique in a two-zone furnace they made a large single crystal of the hyper-hyper-pure anthracene. They sandwiched little slices of the crystal between transparent electrodes, applied voltage, and illuminated with an air spark of microsecond duration and very high intensity. They compared current vs. time oscillograms for illumination of the positive side with those for illumination of the negative side. The curves told how long an electron or a hole could drift in the crystal lattice between being set loose by the flash and being trapped by an irregularity or impurity in the lattice. Both electrons and holes showed lifetimes of about 200 microseconds. It is very unusual to have longlived electrons and holes in the same organic photoconductor. Not only is this very interesting, but long lifetimes permit accurate measurements of the mobility of electrons and holes.

What is happening to organic chemistry?

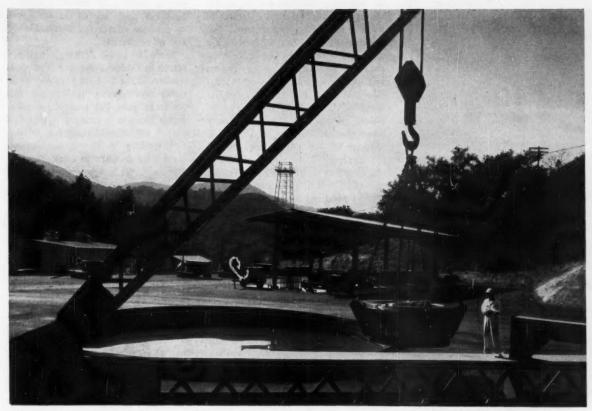
p-Dimethylaminobenzaldehyde, quinoline, and anthracene were all offered the first year of Eastman Organic Chemicals, 1919. Catalogs bearing that date may have some slight historical interest but are no longer useful. The current one, *List No. 42*, and the two abstracts offered above can be obtained without charge from *Distillation Products Industries*, Rochester 3, N. Y.



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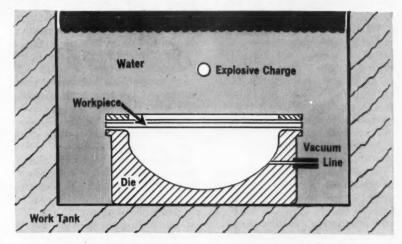


View of four-months-old Aerojet-General explosive-forming facilities at Chino Hills, Calif.

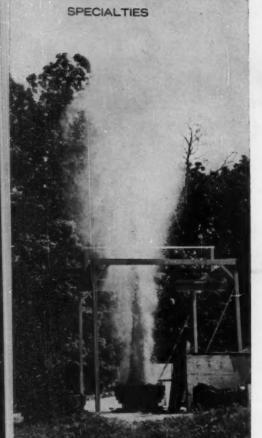
Explosive-Forming Shapes a New Market

At sunny Chino Hills, Calif. (directly east of Los Angeles), new production facilities (above) for explosive-forming of missile and rocket components have recently been put into operation by Aerojet-General Corp., a division of General Tire & Rubber Co. In addition—and perhaps more important over the long run—the company will soon expand its research in this field, as a result of two research contracts (from the Air Force, and from the National Aeronautics & Space Administration) it has received in the last few weeks.

Heralded as the harbinger of a metalworking millenium, explosive-forming didn't (and couldn't) live up to some of its advance notices. Now, the aura of glamor is fading and a more sophisticated appraisal is being made. Upshot for the CPI: explosive-forming—and such offshoots as powder compaction — offers a steadily growing outlet for explosives and in-



How explosive-forming works: The piece to be formed is placed (above) over a female die in a tank, which generally contains water as the fluid medium through which the energy of the explosion is transmitted. The transfer medium may also be oil, molten salts, molten metals, sand (these are usually used for hot forming) or even air. An explosive charge, which may be a cylinder sphere, cord, sheet or other shape, is lowered into the transmitting medium and detonated, forcing the metal into the female die. The vacuum line is used to evacuate air behind the workpiece. This prevents adiabatic compression and heating of the entrapped air, which could burn the rear face of the workpiece as well as the die.



Propellex' explosive-forming unit tosses out water in making Polaris parts.

erting materials, and presents a new way to build better properties into cermets, ceramics, metal alloys and plastics.

What Is It? Most of the published material in this field has been concerned with only one aspect—the shaping of parts from a flat sheet by an explosive detonation, which forces the sheet (see diagram, p. 93) into a female die. Part of this technique: explosive correction of parts made by other methods, and the shaping into a desired final configuration of preformed sheet.

But there is, of course, much more to explosive-forming than these relatively simple shaping operations. Other fabrication techniques based on explosive-forming include: forging; compaction; welding (or joining); laminating; and work-hardening.

Explosive-compaction is especially interesting to the chemical industry because of the high densities it can provide. For instance, up to 96% of the theoretical density of tungsten and molybdenum and 90% of that

of beryllium powder are obtainable via explosive-compaction. Mixtures of metals, ceramics, cermets, etc., impossible to obtain any other way, are now being made by explosive-compaction. The combining of fibrous and powdered materials—e.g., tungsten and molybdenum—has been accomplished, as has the compacting of plastic powders to form extremely dense plastics.

Some of the advantages claimed for explosive-compaction: shrinkage on sintering is markedly reduced; a good surface finish can be obtained, thereby reducing the need for expensive finishing operations. Possibility: in situ sintering during compaction via adiabatic gas compression.

Forging Ahead: Explosive-forming is also useful in forging metals of high strength-weight ratio—e.g., for special processing equipment. This operation usually consists either of three or four successive strong explosions acting on the cold metal, or of a number (e.g., nine) of repeated explosive blows with two or three intermediate annealing operations. By forming the work cold, it is often possible to retain (and sometimes increase) the metal's hardness, which would normally be decreased by conventional hot forging process.

Who's In It: Most explosive-forming work is being done by companies working in the rocket and missile field. These include Aerojet-General, Ryan Aircraft, Rocketdyne, Lockheed Aircraft, Grumman, American Potash's National Northern Division, and Propellex Division of Chromalloy Corp.

Exploration Needed: Although much progress has been made, most of the work has been on the pot-andpan level; there has been little basic understanding of what actually goes on when metal is exposed to the enormous pressures achieved with explosive-forming. At Stanford Research Institute (Menlo Park, Calif.), where high-explosive research has been carried on, it was found that it's possible to double the elongation of materials at high strain rates. However, limited understanding of the response of material at high strain rates has hampered exploitation of this.

SRI's Don Davenport says that explosive-forming techniques have too often been applied in using explosives for jobs that could have been done by conventional means. And he feels that

people working in explosive-forming have not made use of the technique to produce effects not obtainable by any other means.

Sky's No Limit: Although basic research in explosive-forming is needed, workers in the field are planning some rather eye-opening applications for the techniques. For example, considerable thought is being given to the use of explosive-forming for joining and welding in the assembling of space stations while in orbit. The big attraction: the weight-saving that explosive-forming would offer over conventional welding equipment.

Also being looked to is on-site assembling of rocket engines as these grow to sizes impracticable for transporting on available equipment. Use of the ocean, say researchers, offers no great technical problem when considered as an explosive-forming tank for such outsize fabricating.

Maturing: The prospects of explosive-forming as a bona fide member of the metal-fabricating field rather than as a curiosity should enhance its growth. This is the attitude expressed by R. A. Cooley, executive vice-president of Propellex Division of Chromalloy Corp.:

"A few years ago there was a tendency for persons to predict that explosive-forming was a panacea for many metal-fabricating problems. This was unwarranted and was never based on sound reasoning. At that time, a great many inquiries were generated by industry on the forming of very complex and completely inappropriate items by explosives. In '60 we found a deeper and sounder interest in explosive-forming. The items proposed for explosive-forming are now more appropriate for the method and are receiving serious consideration, with significant progress being made."

Similarly, L. Zernow and I. Lieberman, of Aerojet-General Corp., in a recent report on explosive-forming, said: "An unfortunate situation has existed as a result of 'Madison Avenue type' exploitation of the glamorous aspects of explosive metal-forming. This has resulted in the dissemination of incorrect information as well as sheer nonsense. Those who attempt to fabricate hardware on the basis of such nonsense will come face to face with the hard economic facts of life. Some have already gone broke."



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Foams on the Rise

A hot competitive battle for both rigid and flexible urethane foam markets seems to be shaping up in Mexico. At least seven companies will be vying for a piece of the market.

Dow Chemical, through its Mexican associate, Pyrina, S.A., and General Tire & Rubber, through its associate, General Popo, are among the biggest of the contenders. Pyrina's rigid-foam plant (next to its aspirin and herbicide plants) will go into production in August. Initial capacity: about 50 tons/month. General Popo is setting up a flexible-foam operation in its own Mexico City tire plant.

A Mexican outfit, Cia Hulera El Palmar, S.A., the biggest manufacturer of foam rubber products in Mexico, is already in production of flexible urethane foam with a plant said to have a capacity of around 50 tons/month. The Mexican company claims to have developed its own process, says it does not have a manufacturing license from any foreign company.

Pyrina, General Popo and El Palmar all make their foam from propylene glycol bases; another company, Poroflex, S.A., has been making foam for two years from a polyester base, has patents from Germany's Bayer.

General will push its product in Mexico via its widespread tire and rubber products dealers: Dow Ouimica Mexicana, S.A. will market Pyrina's solid and flexible foams; and El Palmar will sell through its foam rubber dealers.

Besides these companies, three or four smaller producers will soon be coming into the urethane foam pic-

EXPANSION

Electronics Chemicals: A new Electronic Chemicals Division to manufacture and market a complete line of chemicals for applications in the electronics industries has been established by Fidelity Chemical Products Corp. (Newark, N.J.). The division's product line will include chemicals used in cleaning and finishing components, especially in the semi-conductor segment of the industry. Specialty materials include descaling solutions, bright dips, carbon removers, epoxy strippers, ultrasonic cleaning agents and paint removers.

Aerosol Growth: Aerosol Techniques (Bridgeport, Conn.) has doubled its operational area by taking over space adjacent to its plant at Bridgeport. The custom-filling operation will cover almost 70,000 sq.ft. in building space, plus about 50,000 sq.ft. in outside area.

Canadian Foam: Canadian Hanson & Van Winkle (Toronto) has entered the field of direct application of urethane rigid foam. It will use a Britishdesigned unit for custom application of the foam.

New Owner: Baltimore Paint & Chemical, a 46%-owned subsidiary of American Dryer, is now under the control of Serrick Corp., which bought about 20% of American Dryer's outstanding common stock.

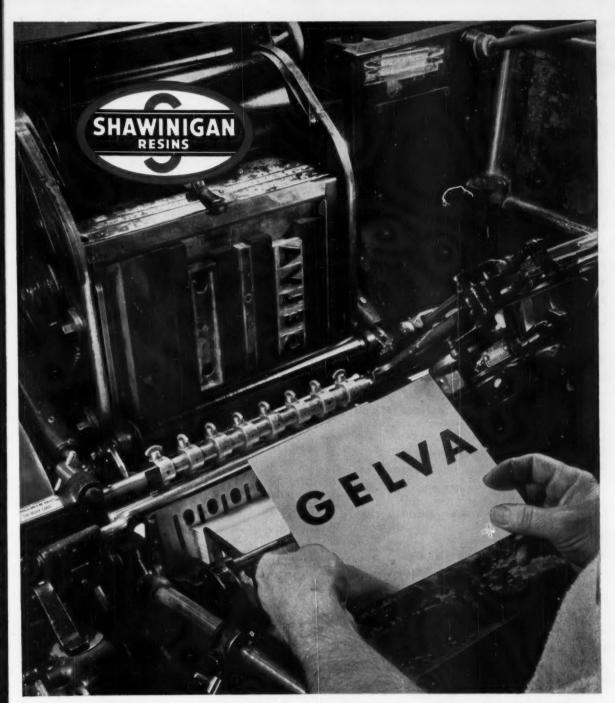
PRODUCTS

Neoprene Coating: Adhesive Products Corp. (1660 Boone Ave., New York) has developed a new liquid neoprene protective coating tradenamed Apco. It's sold in pint, quart, and 1-, 5- and 55-gal. drums, may be applied by brush, spray or paint roller. The coating is suggested for boats, outdoor furniture, tents, machinery, and other uses.

Two for Typists: Old Town Corp. (750 Pacific St., Brooklyn 38, N.Y.) has two new first-aid items for typists. One is Over-Type, a correction paper that is marketed in a Scotch-tapetype dispenser. The other is Over-Type type cleaner. It feeds into a typewriter like a sheet of paper and type is cleaned as it comes into contact with this sheet.

Gold Reclaimer: Precious Metals Recovery Corp. (85 River Rd., Nutley 10, N.J.) has developed a new mechanochemical device for reclaiming gold from electroplating solutions and rinses. It's called the Aurion-X Gold Resin Reclaim, is said to remove over 97% of the gold in either alkaline or acid solutions in one pass.

Masonry Waterproofer: A waterproofing agent for concrete, stucco and other masonry is being marketed



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Chemical Week

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by Guardian Chemical Corp. (38-15 30th St., Long Island City, N.Y.) under the name, Surtiseal. It's a clear liquid containing esters of boron and silicon in an aqueous base.

Roof Coating: A coating for roofs and other exterior surfaces is being sold under the Desco Neolon tradename by Desco International (Box 74, Buffalo, N.Y.). It's a combination of neoprene and Hypalon synthetic rubbers, comes in a wide range of colors, and is said to provide high elastic properties at very low temperatures.

Rubber Additive: A rubber extender, Lipco Paste, based on nylon paste is claimed to decrease molding cycle time 70-80%, according to its producer, Long Island Plastics Corp. (Lindenhurst, N.Y.). It's recommended for shoe lifts, heels, typewriter rollers and sheeting.

Home Fumigant: An aerosol fumigant designed for home use has been developed by Pet Chemicals (Miami, Fla.) under the name Exterm-O-Fog Aerosol Fumigant. It comes in a one-shot, 12-oz. pressure package, which contains Ronnel as the active ingredient along with pyrethrins. One container is said to be enough for treating 10,000 sq.ft.

Antistatic Fluid: A chemical fluid that reportedly prevents buildup of static charges on plastic-faced instruments is being marketed by Daystrom Inc.'s, Weston Instruments Division (Newark, N.J.). It's called Statnul, is packaged in plastic squeeze-bottles and impregnated cloths.

Flexible Polyester: Aropol Q-6030, a new polyester resin developed by Archer-Daniels-Midland Co. (Minneapolis), is being marketed for use in auto body repair compounds, calking and sealing compounds and other applications in which flexibilty is desired. The material is said to be so flexible a casting made from the resin won't crack or shatter when a nail is driven through it.

Slimicide: Metropolitan Refining Co. (50-23 23rd St., Long Island City, N.Y.) is marketing an odorless slimicide, Vaporene R, for use in airconditioning systems.

Tracers

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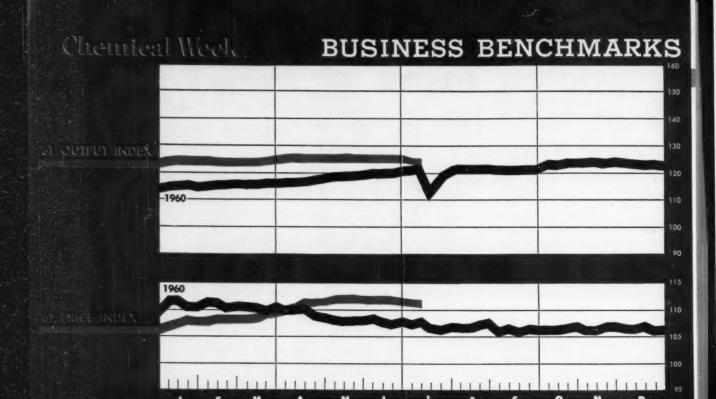
1000 pound MacLellan Conical Blender. \$540.00, FOB Memphis, Tennessee. Cougar Chemical Company, 1041 N. Hollywood, Memphis, Tennessee.

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Acetone-Recovered. High quality material in T/W lots. Northern N. J. FS-7020, Chemical Week.

EQUIPMENT WANTED

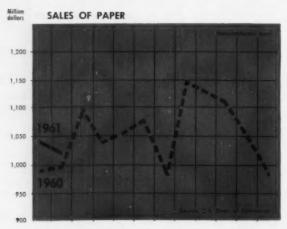
Wanted: Change can (pony) mixer, steel, 40 to 80 gal.; send condition, make and price to Bromine Producers Co., 1219 E. Church St., Adrian, Mich.



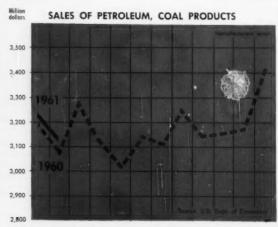
JULY 8, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	122.7	123.1	115.0
Chemical Week wholesale price index (1947=100)	110.0	110.3	108.3
Stock price index (12 firms, Standard & Poor's)	45.60	53.22	51.64
Steel ingot output (thousand tons)	1.978	1.985	1.739
Electric power (million kilowatt-hours)	14,870	15.345	14,604
Crude oil and condensate (daily av., thousand bbls.)	7,096	7,105	6,819
WHOLESALE PRICE INDICATORS (1947-49=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	127.8	127.9	128.2
Chemicals and allied products	110.7	110.8	110.2
Industrial chemicals	123.1	123.4	124.6
Paint and paint materials	123.8	124.0	119.0
Drugs, pharmaceuticals and cosmetics	94.7	94.7	94.8
Fats and oils (inedible)	61.0	61.1	50.2
Fertilizer and materials	112.0	112.0	108.8

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